ID: 88076782

Box 2
Item 2-147

South Tobacco Roots Watershed Assessment Report

Dillon Field Office

January, 2007

South Tobacco Roots, October 2006

Table of Contents

Introduction 1

Background 2

Cultural History 3

Authorized Uses 3

Assessment Process 8

Uplands
- Affected Environment 9
- Analysis and Recommendations 12

Riparian and Wetland Areas
- Affected Environment 16
- Analysis and Recommendations 18

Water Quality
- Affected Environment 24
- Analysis and Recommendations 24

Air Quality
- Affected Environment 26
- Analysis and Recommendations 26

Biodiversity
- Affected Environment 27
- Analysis and Recommendations 32

Forest Health and Fuels Management
- Affected Environment 38
- Analysis and Recommendations 42

References 45

Tables

Table 1. Grazing Allotments Summary 5
Table 2. General Cover Types Summary 11
Table 3. Upland Qualitative Assessment Summary 13
Table 4. Riparian Functional Status 19
Table 5. Riparian Community Types 21
Table 6. Montana DEQ 303-d listed Streams in STR 24
Table 7. Weed Treatments 30

Table 8. STR Fisheries Inventory 31
Table 9. Historical Fire Regimes 40
Table 10. Fire Regime Condition Class 41

Figures

1. Upland Functionality 15
2. Riparian Status 22

Maps

1. South Tobacco Root Watershed Assessment Area
2. South Tobacco Root Grazing Allotments
3. South Tobacco Root Riparian/Wetlands (North Half)
4. South Tobacco Root Riparian/Wetlands (South Half)
5. South Tobacco Root Forest Insect & Disease
6. South Tobacco Root Conifer Encroachment

Introduction

This document is a land health assessment of the public lands administered by the Bureau of Land Management (BLM) in the South Tobacco Roots (STR) Watershed (**Map 1**).

This is the first in a series of documents; the Watershed Assessment Report, the Authorized Officer's Determination of Standards, and the appropriate National Environmental Policy Act (NEPA) documentation and subsequent Decision(s) changing management where needed.

The watershed assessment reports the condition and/or function of public land resources within the South Tobacco Roots Watershed to the authorized officer. The authorized officer considers the report to determine if the five standards of rangeland health are currently being met. The authorized officer then signs a Determination of Standards documenting where Standards are met and where they are not.

In addition to the condition/function assessment, the report also contains initial recommendations developed by the interdisciplinary team (IDT) during field assessments. The recommendations in the report focus primarily on livestock grazing, noxious weed management, and timber and fuels management, but also cover other programs, land uses, and activities including; recreation, wildlife habitat, fisheries habitat and road maintenance. Impacts from all uses and programs were assessed and documented as part of this process.

The assessed condition, function and recommendations in the Assessment Report and Determination of Standards will be used in the NEPA process. An environmental assessment (EA) will be completed addressing all resource concerns in the watershed. The EA will include all BLM-administered public lands covered in the assessment.

Alternative management will be analyzed wherever it is determined that:

- specific grazing allotments are not meeting the Standards
- allotments are meeting the Standards but have site specific concerns
- there are unhealthy forest conditions in the watershed
- fuels conditions are outside the natural range of variability
- other documented resources concerns

Also, if existing grazing management practices or levels of grazing use on public lands are determined to be significant factors in failing to achieve one or more of the five standards, the BLM is required by regulation (43 CFR 4180.1) to make grazing management adjustments.

Implementation of new plans will begin in 2007, but full implementation of forest treatments, fuels projects, revised grazing plans and/or range improvement projects associated with these plans may take several years.

The new plans will be developed in consultation and coordination with the affected lessees, the State having lands or managing resources within the area and other interested parties.

As with all similar BLM decisions, affected parties will have an opportunity to protest and/or appeal these decisions.

Background

The South Tobacco Roots Watershed is located in Madison County, Montana. The watershed drains portions of the Tobacco Root, Ruby, and Gravelly mountain ranges. The watershed lies within Townships South 3-7 and Ranges 1-5 West, Montana Principal Meridian (M.P.M). The assessment area covers public lands administered by the BLM from Ennis west to Twin Bridges, Montana.

The assessment area boundary follows grazing allotment boundaries and includes some allotments that are only partially within the watershed. Technically, the assessed area is not a distinct watershed. Watersheds are defined, and designated on maps, by natural topographical boundaries (ridgelines/drainages). On the other hand, grazing allotments boundaries are determined by land ownership and these artificial boundaries may not follow topographical features. Therefore, some of the grazing allotments in the assessment area fall within one or more watershed or hydrologic unit.

Within the STR assessment area, there are approximately 230,595 total acres of land, of which 33,629 are public lands administered by the BLM. This report addresses only land health conditions on public (BLM) land.

Elevations on BLM lands within the assessment area range from approximately 4,500 to 8,500 feet. Topography varies from stream drainage bottoms to steep mountain ravines.

Vegetation in the watershed reflects the diversity of ecological conditions across the landscape. The dominant plant communities and habitat types change according to soils, precipitation, elevation, slope and aspect (direction the slopes are facing). A wide variety of vegetation is found from wetland and riparian species dependent on water and moist soils to sagebrush and grass dominated plant communities that thrive on dryer upland sites. Forested habitats cover the higher elevations.

The watershed's diverse landscape and vegetation provides habitat and structural niches for a wide variety and abundance of wildlife.

Average annual precipitation within the watershed varies from less than 14 inches on the lower benches to more than 24 on the higher peaks of the Tobacco Roots.

The Dillon Field Office completed a new Resource Management Plan (RMP) in February of 2006. This document will provide program guidance in the Dillon Field Office for the next 20 years. The RMP replaces The Dillon Resource Area Management Framework Plan (1979) and the Mountain Foothills Environmental Impact Statement (EIS) - Rangeland Management Program Summary (1981).

By working on a watershed basis, a broader landscape is considered and more consistent management can be applied.

It is the BLM's intent to implement watershed management cooperatively. Any changes in livestock management will be implemented through grazing decisions that address allotments or groups of allotments with a common lessee. Forest health and fuels management treatments or projects, noxious weed management, and any other management projects or changes will be implemented through Decisions appropriate for the respective programs.

Cultural History

In conjunction with the Mountain Foothills Grazing EIS in the late 1970s, a Class II cultural resources inventory was conducted for a 10% sample of lands within the Dillon Resource Area. Results of the sample inventory located a mixture of prehistoric and historic sites throughout the watershed.

Prehistorically, the South Tobacco Roots Watershed was occupied continuously beginning approximately 10,000 years ago. Prehistoric sites within the watershed are primarily small habitation or procurement sites.

Historic occupation of the South Tobacco Roots began with the fur trapper trade in the 1830s and intensified with the discovery of gold in the region and the implementation of placer mining and eventually hard rock mining. Placer mining started in Virginia City in 1863 and includes the mining districts of Tidal Wave, Sheridan, and Virginia City. Hydraulic placer mining has channelized many of the streams in the watershed significantly impacting stream gradients.

Authorized Uses

Forest Products

Forest resources in the watershed have been extensively utilized since the mining boom in the 1860's. Evidence, in the form of old stumps from the 1800's through the 1920's, can be found across all ownerships throughout the entire assessment area. As a result, old access trails and roads were, and in some cases still are, common across the landscape.

Recent forest management activities (timber harvests) on BLM administered lands occurred in the 1980s in the Granite and Meadow Creek areas in the southeastern Tobacco Roots. These activities covered about 530 acres of forest lands. During that same time there was also about 300 acres of timber harvested in the Alder Gulch area.

A very limited amount of post and pole activity in small diameter lodgepole pine has occurred.

Special Recreational Uses

Recent land use planning for the Dillon resource area calls for maintaining (without increase) historic (pre-2006) levels for outfitted big game hunting within seven Outfitter Permit Areas.

The BLM currently authorizes two commercial operators who provide outdoor recreation opportunities to the public in the South Tobacco Roots watershed. One conducts day-use big game hunting trips within the Fletcher/Moore Creek drainage in conjunction with the adjacent privately owned Valley Garden Ranch. The other conducts day-use horseback trips in the Fletcher Creek area in conjunction with their authorized use on the adjacent National Forest. No overnight commercial use, special recreation events, or vendors are authorized within the watershed.

Scattered parcels of publicly owned land, often surrounded by private land, are common throughout the watershed making monitoring restricted recreational uses, including unauthorized off-road travel, difficult.

Travel management prescriptions have been in place since the early 1980s, however many areas designated as "areas open to off-route travel" are now "limited" to designated routes under the regulations at 43 CFR Part 8340-8342. Motorized use prescriptions vary throughout the watershed and range from closed to all motor vehicles including snowmobiles, to open to all motor vehicles yearlong on existing, designated routes and trails. The use of vehicles for game retrieval is also restricted.

The majority of recreational use within the watershed occurs during the fall big game hunting season. Most public land parcels serve as access corridors to recreational opportunities within the adjacent National Forest. Some horseback use, skiing and off highway vehicle use does occur throughout the year. There are no developed recreation facilities in the STR watershed.

The Tobacco Root mountain range has been classified through the land use planning process as a Class III visual resource. The objective for managing this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape may be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes caused by management activities may be evident but should not detract from the existing landscape.

Mining

Mineral activity in the South Tobacco Root watershed is currently very limited. Much of this area has high potential for locatable mineral development but due to numerous factors active exploration and development is minimal. There are several 43 CFR 3809 Notices (exploration) on file but little activity is currently taking place. There is one Plan of Operation being processed to haul 15,000 tons of waste rock across BLM administered land from land managed by the U.S. Forest Service.

With the high mineral potential in this area, an extensive amount of historic mining has taken place since the 1860's. There are numerous old shafts, adits, mills and other related features within the assessment area. The State of Montana is currently working on an Abandon Mine Project (mostly on patented land) northeast of Sheridan on Mill Creek. Although there are no sites identified as major environmental concerns on BLM administered lands, there is always the

potential that an abandon mine could cause environmental damage. The BLM continues to mitigate abandon mines as funding and resources are available.

There is one mineral material community pit (salable minerals) in this area located northeast of Laurin. No material has ever been removed from this site. There are no current exclusive mineral material sales in the area. There are also no active leases for minerals in the assessment area.

Livestock Grazing:

The assessment area includes 30 grazing allotments (units) covering 32,431 acres of public land (**Map 2**). Twenty four different ranches, business entities or individuals hold grazing authorizations on these allotments. The STR assessment area also includes 1,198 acres of un-allotted land on the north slope of the Ruby Mountains and 40 acres of un-leased public land near Alder, Montana. All livestock grazing allotments in the Dillon Field Office have been categorized as Improve (I) Maintain (M) or Custodial (C) based on resource values and opportunities for improvement.

BLM administered lands provide a large proportion of the late spring, summer and fall forage base in the watershed. There are 4,530 animal-unit months (AUMs) of allocated livestock forage on public lands within the allotments. The stocking rate on BLM lands within the watershed averages 7.2 acres/AUM and varies from 4 acres/AUM to 20 acres/AUM. This variance is influenced by soils, vegetative type, topography (aspect, elevation, and slope), distance from water and local weather. Cattle are designated as the "kind" of livestock authorized to graze on twenty nine allotments in the watershed and one authorizes horses.

Table 1 summarizes pertinent information concerning the grazing allotments in the South Tobacco Roots Watershed.

Table 1: Grazing Allotments Summary

Allotment name, number and category	Authorization Number	Season of Use	Livestock Number & Kind	[1]Grazing System	BLM Stocking Rate:	BLM AUMs	BLM Acres	Other Ownership	Total Acres
Baker Summit 10487 (C)	2500172	5/15-10/20	2 C	Season Long	16:1	26	428	0	428
	2500087	5/15-10/28	3 C						
Ballard 10456 (I)	2505663	6/15 – 9/29	36 C	Season Long	8:1	127	1022	905	1927
Benchmark 20489 (M)	2505664	5/1-9/1 in south pasture	131 C	Season Long	4:1	212	1057	3980	4881
	2505694	10/3-11/1 in north pasture	131 C						

Allotment name, number and category	Authorization Number	Season of Use	Livestock Number & Kind	[1]Grazing System	BLM Stocking Rate:	BLM AUMs	BLM Acres	Other Ownership	Total Acres
Brandon 20481 (M)	2505775	6/2 - 6/15	113 C	Season Long	10:1	65	652	188	840
	2500146		58 C						
Brandon Isolated 10448 (C)	2500146	5/1 – 6/15	1 C	Season Long	4:1	2	8	116	124
Cal Creek 10507 (M)	2500087	6/1 – 10/15	965 C	RR	5:1	1130	6066	15734	21904
Copper Mountain 10531 (I)	2505535	6/15 – 10/15	83 C	Season Long	5:1	104	549	1226	1775
Cow Creek 20446 (C)	2505732	5/16 – 5/31	6 C	Season Long	10:1	5	48	0	48
Downey Creek 20581 (C)	2505663	6/1 – 10/14	5 C	Season Long	18:1	22	398	1347	1745
Dry Lakes 20526 (C)	2505779	6/1 – 10/23	32 C	Season Long	7:1	152	1146	5112	6258
Elser 20477 (C)	2505728	7/1 – 10/10	7 C	Season Long	13:1	23	301	414	715
Fletcher-Moore 30428 (I)	2505694.	5/15 – 12/1	33 C	Season Long	8:1	213	1721	6960	8681
Funk 10478 (C)	2505729	6/1 – 10/30	5 C	Season Long	12:1	23	271	842	1113
Georgia Gulch 20348 (I)	2500148	5/1 - 9/1	78 C	DR	9:1	232	2077	1641	3719
Granite Creek 10468 (M)	2505720	5/16 – 9/29	60 C	Season long	9:1	184	1655	597	2252
Granite-Moore 10427 (C)	2505694.	5/20 – 10/20	31 C	Season Long	9:1	157	1412	136	1548
Hillside 10514 (C)	2505766	5/1 – 2/28	3 C	Season Long	8:1	36	282	534	816
Hungry Hollow 10491 (C)	2500154	5/15 – 0/29	32 C	Season Long	14:1	177	2418	5625	8043
Lott 10331 (C)	2505705	8/16 – 0/14	20 C	Season Long	10:1	39	379	800	1189
	2505792	06/12 - 6/13	trailing permit						

Allotment name, number and category	Authorization Number	Season of Use	Livestock Number & Kind	[1]Grazing System	BLM Stocking Rate:	BLM AUMs	BLM Acres	Other Ownership	Total Acres
Mc Govern 00957 (M)	2500112	6/01-10/01	121 C	Season Long	7:1	249	1639	4236	5875
	2500087	6/01-10/15	84 C						
Mill Gulch 10475 (M)	2505726	6/15 – 9/24	53 C	DR	7:1	80	531	262	793
Mill Gulch Isolated 20450 (C)	2505726	6/1 – 10/1	5 C	Season Long	5:1	20	98	325	423
Miller 20418 (C)	2500103	3/1 – 2/28	2 H	Season Long	10:1	4	40	122	162
Ramshorn 10552 (I)	2055784	5/20 – 7/2	83 C	Season Long	10:1	204	2037	1629	3666
	2500944								
Sand Coulee 20679 (I)	2500167	5/1 – 11/15	6 C	Season Long	14:1	42	590	43	633
South Daisy 20399 (M)	2505682	6/21–7/15	14 C	Season Long	16:1	89	1382	242	1624
	2505694	7/15 – 10/14	12 C						
Valley Garden 10547 (C)	2505594	6/1 – 7/21	6 C	Season Long	8:1	10	81	0	81
Virginia City Hill 10521 (M)	2505664	5/1 – 11/24	187 C	RR	4:0	396	2722	5712	8182
	2500145	6/15 – 9/01	15 C			39			
Wisconsin Creek 10501 (I)	2505753	6/15 – 10/25	55 C	Season Long	7:1	202	1381	338	1715
Wisconsin Creek Isolated 10523 (C)	2505753	5/15 - 10/12	5 C	Season Long	20:1	2	40	0	40
Totals					7:2	4,530	32,431		

[1]*Abbreviations: RR= rest rotation, DR = deferred rotation*

Assessment Process

This assessment was done in accordance with the BLM regulations regarding Rangeland (Land) Health Standards (Standards).

- BLM Manual H-4180-1, Rangeland Health Standards Handbook and Guidance for Conducting Watershed-Based Land Health Assessments.
- Code of Federal Regulation 43 CFR, Subpart 4180
- Record of Decision (ROD) - Standards for Rangeland Health and Guidelines for Livestock Grazing Management (S&Gs) for Montana, North Dakota and South Dakota.
- Healthy Forest Initiative
- Healthy Forests Restoration Act
- National Fire Plan

Rangeland Health Standards are described in detail in the Record of Decision (ROD) Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Montana, North Dakota, and South Dakota-Western Montana Standards. The preamble of the Western Montana Standards states: "The purpose of the S&Gs are to facilitate the achievement and maintenance of healthy, properly functioning ecosystems within the historic and natural range of variability for long-term sustainable use." Standards are statements of physical and biological condition or degree of function required for healthy sustainable lands. Achieving or making significant progress towards these functions and conditions is required of all uses of public lands as stated in 43 CFR 4180.1.

This assessment will report condition and/or function for the following five standards:

Standard #1 Upland Health
Standard #2 Riparian /Wetland Health
Standard #3 Water Quality
Standard #4 Air Quality
Standard #5 Biodiversity

Condition/function statements regarding the Standards are made as:

- Proper Functioning Condition (PFC)
- Functioning At Risk (FAR); which is assigned a trend of up, down, static, or not apparent
- Nonfunctioning (NF)

Land Health Standards are met when conditions across an allotment are at PFC or FAR with an upward trend. This is dependent on scope and scale and determined by the Authorized Officer. In addition, this assessment will report condition and/or function for forest health and fuels. Forest health can affect each of the five standards, but in this assessment will be reflected under Standard #5 Biodiversity, along with other factors that affect biodiversity.

Assessments are made on an allotment scale, with the exception of Air Quality and Forest Health which are made at the watershed level.

Available trend monitoring data, existing inventories, historical photographs and standardized methodology are used by an interdisciplinary team (IDT) to assess condition and function. In addition, Ecological Reference Areas are identified by the IDT and used to compare health and productivity of similar sites and soils.

Trend monitoring data, riparian assessment data and historic photographs used for this assessment are available at the Dillon Field Office.

Format

The Upland, Riparian, Air Quality, Water Quality, and Biodiversity Standards and the Forest Health and Fuels will follow the following format:

1) Affected Environment - This section briefly describes the area and resources that were assessed.

2) Analysis and Recommendations - This section lists the findings and includes recommendations suggested by the IDT during the field assessments.

Uplands

Western Montana Standard #1: *"Uplands are in Proper Functioning Condition."*

Affected Environment

Forests, sagebrush and grassland areas are considered uplands for purposes of this report. According to satellite imagery, approximately 54 percent of the watershed is sagebrush dominated habitat, 28 percent forested and 12 percent grasslands.

The variety and distribution of plant communities and seral stages in the watershed area is a function of climate, geology, and soil combined with:

- historic uses (grazing and timber harvest)
- short term weather patterns
- disturbance regimes (drought, fire, floods and herbivory)

Soils

The topography of the South Tobacco Roots watershed is dominated by short mountain ranges and intermontane basins or valleys. The mountains are the result of uplift and faulting and the basins were progressively filled with sediment carried down streams draining the mountains. Volcanic material, such as ash and breccie, were added to the excessive sediment load in the basins, resulting in a complex mixture of debris.

Soils are affected primarily by climate and parent material. Elevations range from about 4,500 to over 8,500 feet. Rangeland soils receive 10 to 24 inches of average annual precipitation over the majority of the watershed.

The soils on the floodplains are nearly level to gently sloping, deep and well drained to poorly drained and formed in alluvium (deposited by water). These soils are used mainly as irrigated cropland, rangeland, and pastureland.

Semi-arid upland soils are nearly level to very steep and are well drained or even excessively drained. They formed in alluvial and erosive material and in material derived from igneous (molten) and metamorphic (altered composition, crystalline) rock.

Soils on subhumid uplands are shallow to deep, well drained and nearly level to steep. They formed in alluvium, colluvium (moved by slide or local wash), glacial till (unsorted material), erosive material and in materials from igneous and metamorphic rock. They are used mainly as rangeland.

The STR also contains soils on mountains which are gently sloping to very steep. These soils are deep and well drained. They formed in alluvium, colluvium, glacial till, and in material derived from shale. This group of soils is used mainly as woodland, wildlife habitat, and some rangelands.

Deposition of alluvial fans and terraces are on-going. Soils in the assessment area are mainly sandy loams, loams and clay loams and can be very deep.

Vegetation

The upland plant composition in the South Tobacco Roots is changing as the result of ecological succession. The natural progression from early seral (successional) stage plant communities towards a climax plant community (the final vegetation community and highest ecological development) is inevitable. Aerial photographs clearly show the spread of coniferous forest species down slope onto benches previously dominated by sagebrush and cool season grasses. The spread of primarily Douglas-fir and Rocky Mountain juniper can be attributed, in part, to the reduced frequency of wildfire fire which has changed the dominant plant species and habitat types on much of the uplands in the watershed. This shift affects the overall biodiversity of the watershed and is addressed in greater detail in the Biodiversity Standard # 5 section of this report.

Most of the watershed's public land uplands (54%) are dominated by several species of sagebrush, mountain big sagebrush (*Artemisia tridentata spp. vasayana),* Wyoming big sagebrush (*Artemisia tridentata spp. wyomingensis*), basin big sagebrush (*Artemisia tridentata tridentata)*, three-tip sagebrush (*Artemisia tripartita*) and black sagebrush (*Artemisia arbuscula var. nova)*. Cool season range grasses grow in the under story of these sagebrush/grassland habitats. Some of the prominent herbaceous species include bluebunch wheatgrass (*Pseudoroegneria spicatum*), western wheatgrass (*Agropyron smithii*), Sandberg's bluegrass

(*Poa sandbergii*), needle-and-thread grass (*Hesperostipa comata*), prairie junegrass (*Koeleria macrantha*) and Idaho fescue (*Festuca idahoensis*).

Forested habitats occupy a significant proportion of the BLM land in the STR (28%). A wide elevation variance promotes a diverse mixed conifer forest. Species include Douglas-fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta)*, limber pine (*Pinus flexilis*), Englemann spruce (*Picea engelmannii*), subalpine fir (*Abies lasiocarpa*), whitebark pine (*Pinus albicaulis*), Rocky Mountain juniper (*Juniperus scopulorum*). Also, numerous aspen (*Populus tremuloides*) stands and two species of cottonwoods, black cottonwood (*Populus balsamifera spp. trichocarpa*) and narrowleaf cottonwood (*Populus angustifolia*) contribute to structural diversity and canopy cover.

Rubber rabbitbrush (*Chrysothamnus nauseosus*), green rabbitbrush (*Chrysothamnus viscidiflorus*), fringed sagewort (*Artemisia frigida*) and broom snakeweed (*Gutierrezia sarothrae*) are common native shrubs found on numerous ecological sites throughout the watershed. If any of these shrubs have greater than 5% canopy cover on a site, it usually indicates that site has been subject to some kind of past disturbance.

Scattered patches of curleaf mountain mahogany (*Cercocarpus ledifolius*) are found on rocky slopes and ridges throughout the watershed. It is a good source of winter forage for deer and year around cover for deer and antelope.

Winterfat (*Krascheninnikovia lanata*) and gray horsebrush (*Tetradymia canescens*) are found in the limey soils along with Indian ricegrass (*Oryzopsis hymenoides*), western wheatgrass and needle-and-thread grass.

No sensitive plant species have been documented in upland habitats on BLM administered lands in the STR assessment area. Sensitive plants have been found on nearby upland habitats and include spiny skeletonweed (*Stephanomeria spinosa*), buff fleabane (*Erigeron parryi*), showy townsendia (*Townsendia florifera*), and taper-tip desert-parsley (*Lomatium attenuatum*). These plants typically inhabit open, rocky, often limestone-derived soil of exposed ridges and slopes in grasslands, sagebrush steppe ranging from the valley and foothill zones.

Current vegetative cover was calculated using satellite imagery (SIMPPLLE data). Table 2 summarizes the different cover types on all land ownerships within the South Tobacco Roots watershed.

Table 2: General Cover Types Summary

Cover Type	BLM Acreage	% of BLM Acreage	Total Watershed Acreage	% of Total Acreage
Forests	9,495	28	64,313	28
Grasslands	3,871	12	45,392	20
Sagebrush/Mountain Shrubs	17,940	54	81,263	35
Riparian/Mesic Shrubs	405	1	7,929	3
Aspen	190	>1	1,391	>1
Mountain Mahogany	1,403	4	3,264	1

Agriculture/Water	178	>1	27,041	12
Totals	**33,482**	**100**	**230,595**	**100**

Upland Vegetation Treatments

Through the years the BLM has implemented several prescribed burns in the assessment area. In April, 1987, the Granite Creek Burn (project file #476876) covered approximately 200 acres of sagebrush and grass east of Granite Creek (T6S R3W sections 2 & 10). The primary objective of the burn was to reduce soil erosion under the sagebrush canopy. Competition for limited water and soil nutrients had reduced grasses in the understory resulting in increased bare ground and erosion. Reducing the sagebrush provided the grasses a competitive advantage which increased individual plant vigor and herbaceous ground cover while affectively reducing the erosive effects of wind and water. In 1986, 95 acres of public land was burned to reduce sagebrush between Indian Creek and Nonpariel Creek in the Brandon Pasture allotment. Another prescribed burn was also implemented in the Slade Creek drainage in the Virginia City Hill allotment to reduce sagebrush canopy.

Noxious Weed and Cheatgrass Infestations

Noxious weeds are a persistent and serious resource concern throughout the STR watershed. Weeds are found in the upland and riparian habitats and have a profound affect on plant and animal biodiversity wherever they establish. Because noxious weed infestations are impacting the overall biodiversity of the watershed, the description and discussion of the issue is found in the Biodiversity section of the report.

Analysis and Recommendations

Procedure to determine conformance with Standard

The uplands were assessed on an allotment basis according to Interagency Technical Reference 1734-6 "Interpreting Indicators of Rangeland Health." This qualitative process evaluates 17 "indicators" (e.g., soil compaction, water flow patterns, plant community composition) to assess three interrelated components or "attributes" of rangeland health; soil/site stability, hydrological function, and biotic integrity. The IDT visits specific ecological sites ("...land with specific physical characteristics which differs form other kinds of land in its ability to produce distinctive kinds and amounts of vegetation...") and rates each indicator on the degree of departure-if any- from what is expected for the site. The rating for each indicator is then weighed to determine the degree of departure of the 3 attributes of rangeland health (Table 3, Upland Qualitative Assessment Summary). The Natural Resource Conservation Service has developed Ecological Site Descriptions based on specific soil types, precipitation zones and location. They describe various characteristics and attributes including what vegetative species-and relative percentage of each- are expected to be present on the site. The IDT refers to these site descriptions while completing the upland evaluation matrix.

Members of the IDT visited all the grazing allotments, and the un-allotted public land in the STR, during 2006 and completed 10 *Rangeland Health Indicator Evaluation Matrices*. In

addition, 22 trend studies and 17 permanent photo plots established in the 1970s and early 1980s were duplicated in 2005 and 2006 to help determine vegetative trend. The data collected was summarized and compared to baseline data providing supporting information for interpreting the upland indicators.

The STR watershed was also evaluated for weed infestations using treatment records and inventories from the Dillon Field Office, the Madison County Weed Coordinator and our collective inventories and observations during the field assessments.

Findings and Analysis for Upland Health

The vast majority of the uplands in the watershed are functioning properly and meeting the Standard for Upland Health. Table 3 outlines the findings at 10 ecological sites, where the IDT completed an Indicators of Rangeland Health evaluation. A moderate departure from expected conditions is analogous to functional at risk rating (DOI BLM 2000). Upland sites that were found to be in the -none to slight- or -slight to moderate- departure from expected conditions category are considered to be in proper functioning condition.

Table 3: Upland Qualitative Assessment Summary

Allotment Name	Ecological Site	Plant Association	Degree of Departure from Expected		
			Soil Site Stability	Hydrologic Function	Biotic Integrity
Ballard 10456 (I)	Silty 15-19	Mountain big sagebrush/ Idaho fescue	None to Slight	None to Slight	None to Slight
Brandon 20481 (M)	Silty 15-19	Wyoming big sagebrush/ thickspike wheatgrass	Slight Moderate	Slight to Moderate	Slight to Moderate
Cal Creek 10507 (M)	Silty 10-14	Three-tipped sagebrush/ Idaho fescue	None to Slight	None to Slight	Slight to Moderate
Fletcher-Moore # 1 30428 (I)	Shallow to Gravel 10-14	Mountain big sagebrush/Idaho fescue	None to Slight	None to Slight	None to Slight
Fletcher-Moore # 2 30428 (I)	Silty 15-19	Mountain big sagebrush/Idaho fescue	None to Slight	None to Slight	None to Slight
Granite Creek 10468 (M)	Silty 10-14	Mountain big sagebrush/Idaho fescue	Slight to Moderate	Slight to Moderate	Slight to Moderate
Lott 10331 (C)	Silty-Limey 10-14	Wyoming big sagebrush/ bluebunch wheatgrass	None to Slight	None to Slight	None to Slight
Mc Govern 00957 (M)	Silty 15-19	Mountain big sagebrush/ Idaho fescue	Slight to Moderate	Slight to Moderate	Slight to Moderate

Sand Coulee 20679 (I)	Shallow 10-14	Mountain big sagebrush/ Idaho fescue	Moderate	Moderate	Slight to Moderate
Virginia City Hill 10521 (M)	Silty 20-24	Mountain big sagebrush/ Idaho fescue	None to Slight	None to Slight	None to Slight

In addition, BLM personnel collected data at 20 long term vegetative trend study sites in 11 allotments during the 2005 and 2006 field seasons. Data from 12 monitoring transects show an average vegetative canopy increase of 11.4 % since the last time data was collected on each site. On the other hand, 5 study sites have had an average canopy decrease of 13.8 %. And, three sites were basically static with less than 1% change. Changes in the total percentage of canopy cover on a given site may be affected by many interacting variables. Combinations of annual weather, plant mortality, grazing utilization, plant disease, wildfire, weed treatments, recreational use and other activities all affect ecological processes to some degree and contribute to changes (both positive and negative) to plant composition and vigor, soil stability, and biotic integrity. Ecological systems are dynamic, and change is natural and constant.

The IDT reviewed the long term trend study data, conducted extensive field surveys, and used the Indicators of Upland Health assessment process to assess the functionality of the upland habitat in the STR watershed.

The public land uplands in 26 allotments are in proper functioning condition (PFC), but 4 were found to be functional at risk (FAR) with a static or downward trend; Hungry Hollow, Cow Creek, Brandon Pasture, and Sand Coulee.

Noxious weeds and invasive species are found in many disturbed areas, such as roads, power line easements, and old mines throughout the STR watershed. But, in two allotments, the Brandon Pasture and Hungry Hollow, the IDT found well established populations of noxious weeds scattered in numerous locations in the uplands. In the Brandon Pasture allotment, dalmatian toadflax is found scattered in several locations. In the vicinity of one long term vegetation study, the IDT noted the presence of toadflax, knapweed and cheatgrass in wide spread moderate amounts. One gully close to the study transect is re-vegetating primarily with spotted knapweed. Toadflax was also found in patches along the south facing slopes adjacent Nonpariel Creek in the southwestern portion of the allotment. Also, there is a large well established monoculture of cheatgrass on the south facing hills above Nonpariel Creek. Spotted knapweed has spread from the Tamarack mine in the middle of the allotment into the rolling sagebrush covered hills west of Spring Creek and throughout the allotment's uplands.

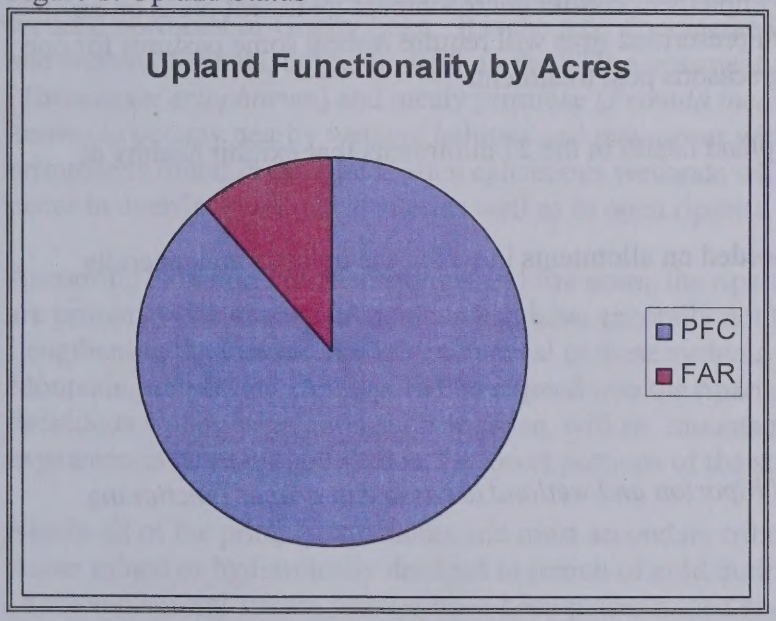
In a pasture in the Hungry Hollow allotment, located upon the ridge east of Baker Spring (T6S R3W section 19), the uplands are inundated with large vigorous patches of spotted knapweed growing in dry shallow soils on south facing hillsides, on top of ridges and in gullies. This ridge is also covered with encroaching juniper. Both knapweed and juniper are well adapted to dry, shallow, saline soils and are very competitive for limited soil nutrients and moisture.
The uplands in the Cow Creek allotment are at risk because of erosion, bare ground, and impacts from livestock. Cow Creek is a very small, 48 acre, custodial allotment. It borders private land and the poor boundary fence allows access to the allotment by unauthorized horses. The IDT

observed evidence of utilization by horses. The main trail running up the dry draw that bisects the steep rocky terrain has numerous rills and side gullies which facilitate soil erosion during run off events. Vegetation has been grazed very low to the ground in many areas resulting in relatively higher amounts of bare ground than would normally be expected for the site. The vegetation composition has also been impacted. The dry, rocky and steep terrain limits access by livestock to the upper portion of this vertical and narrow bowl. Because of limited available forage and no water the Cow Creek allotment is considered secondary rangeland.

The public uplands in the Sand Coulee allotment are functioning, but at risk due to do a number of factors. Rocky Mountain junipers are increasing across the upland range and consequently grasses are declining. At one upland study site several key evaluation indicators show the uplands at that location are moderately at risk. Bare ground, increased interspaces between plants, increased litter movement and pedestaling around the base of some plants are evidence of soil loss from erosion. The overall plant production for the ecological site is moderately reduced also. The IDT walked into the adjacent uplands and found similar ecological conditions.

Eighty nine percent of the public uplands in the STR assessment area, covering 28,723 acres in 26 grazing allotments, are functioning properly. However, approximately eleven percent of the public uplands, in four allotments, about 3,700 acres, are FAR with a non apparent or downward trend. Figure 1 illustrates functionality status of the uplands by public land acres.

Figure 1: Upland Status



Recommendations for Upland Health

1. Within budgetary constraints, increase the use of Integrated Weed Management tools to treat noxious weeds in the Brandon Pasture and Hungry Hollow allotments, and all other isolated populations throughout the STR, which failed to meet the upland standard primarily because of weed infestations.

2. Consider several management options to improve upland conditions in the Cow Creek custodial allotment. Possible management alternatives include, adhering to current mandatory terms and conditions, revising current livestock management, or eliminating authorized livestock grazing completely. Improve east side boundary fence.

3. Consider revising the grazing system in Sand Coulee to give cool season grasses the opportunity to periodically complete their growth processes and set seed.

4. Continue to address localized weed infestations in the STR assessment area cooperatively with Madison County and other agencies, landowners and partners as appropriate. Continue the existing education effort on weed identification and prevention measure with people who use this area. A concerted effort should be made to target education to hunters and other dispersed recreation users.

5. Coordinate with grazing lessees to implement conifer encroachment treatment plans on an allotment basis. Treating conifers with prescribed fires will require resting some pastures for one year prior to burning and two growing seasons post treatment.

6. Continue to maintain or improve upland health in the 27 allotments that exhibit healthy or improving upland conditions.

7. Address site specific concerns as needed on allotments in which the uplands are generally healthy or improving.

Riparian and Wetland Areas

Western Montana Standard #2: *"Riparian and wetland areas are in proper functioning condition"*

Affected Environment

The STR assessment area is located primarily within the larger Ruby River Watershed. The Ruby River, and many of its tributaries, is a water quality limited stream, according to Montana Department of Environmental Quality (DEQ). Water Quality is discussed below in a separate section, but since it is affected by riparian condition, it is worth restating the goal of the Clean Water Act which is; "restore and maintain the chemical, physical and biological integrity of the Nations waters." Waters of Montana are required to support Fisheries and Aquatic Life. The information in this section addresses the physical and to some extent the biological conditions of

the streams and their associated riparian and wetland habitats. The condition of riparian vegetation, stream bed materials, channel geometry and the ability of riparian areas to attenuate flood water, recharge groundwater, maintain riffles and pools are closely associated with a streams ability to support aquatic life and fisheries. Upland and forest health conditions are also related to the condition of streams since sediment inputs to streams are influenced by upland sources.

The major streams within the STR Watershed Planning Area include Alder Gulch, California Creek, Granite Creek, Indian Creek, Mill Creek, Ramshorn Creek, Wisconsin Creek and Moore Creek. All of these streams, with the exception of Moore Creek, flow into the Ruby River. Moore Creek flows into the Madison River. Each of these streams has several associated tributaries shown in Table 4 below.

The majority of riparian habitats in the STR are Douglas-fir, juniper and aspen riparian habitat types. Spruce habitat types are associated with higher elevation stream reaches. Willow habitat types are found on stream reaches on flatter terrain and generally lower elevations within the watershed (Table 4).

Idaho sedge (*Carex idahoa*) typically occurs in sub-irrigated soils associated with low gradient streams or springs and seeps and occupies ecotones (area where adjacent communities blend) between wet meadow and sagebrush steppe. Knowledge gained by the IDT after the 2006 field season revealed that a small population of Idaho sedge occurs in a diminutive depressional wetland northeast of Grassy Lake. It is the only documented sensitive plant species in riparian and wetland habitats, on public land, in the STR assessment area. Rocky Mountain dandelion (*Taraxacum eriophorum*) and mealy primrose (*Primula incana*) are sensitive plant species known to occupy nearby wetland habitats and may occur within the assessment area. Mealy primrose is found in saturated, often calcareous wetlands while Rocky Mountain dandelion can occur in overflow ecological sites as well as in open riparian and wetland areas.

According to historic photos, stumps and fire scars, the riparian habitats in the STR watershed are primarily fire dependant habitats that have generally not burned in recent history (120 years). Lengthening the historic fire return interval in these systems has allowed more conifers, (Rocky Mountain juniper and Douglas-fir), to expand into the riparian habitat at the expense of deciduous woody vegetation such as aspen, willow, mountain alder and river birch. This conifer expansion is more pronounced in the lower portions of the stream reaches.

Nearly all of the primary tributaries and most secondary tributaries within the watershed were placer mined or hydraulically dredged in search of gold during the gold rush (1863 through 1870) and several stream reaches have been placer mined several times from the gold rush days up to the present. This disturbance has channelized most of the streams, impacted stream gradient and changed the potential of these streams. These streams no longer have their "natural" capability. The placer mining lowered the water table, which made the associated valley bottoms dryer and more conducive to conifer expansion. During this same time period, beavers were trapped out of this area, which further affected the hydrology of streams that had deciduous woody habitat types. The streams furthest north in the watershed and at higher

elevations were impacted less than those closer to Virginia City, which was the hub of the mining activity.

The scattered ownership pattern in the STR watershed further complicates riparian management because upstream sediment sources affecting riparian health may be outside the BLM's authority to mitigate. Also, because of the steep topography in the watershed, roads generally have been constructed in the valley bottoms adjacent to streams. Some of these roads are BLM roads, but many are Madison County or private roads.

Noxious and invasive species, discussed below under Standard #5, are present in varying degrees along many riparian areas within the STR watershed primarily because of the disturbance caused by historic placer mining. Noxious weeds affect riparian health and function depending on the degree of infestation. Weeds are also present along many roads and utility corridors within the watershed.

The higher elevation, steeper streams in the northwestern portion of the watershed such as Indian, Noble Fork, Ramshorn, Wisconsin Creek and Mill Creek are steep cascading stream systems that are very stable with conifer-dominated habitat types.

Analysis and Recommendations

Procedure to determine conformance with Standard

Wetlands, streams and their associated riparian areas were evaluated in 2005 and 2006 using several complimentary monitoring and evaluation methodologies, the Montana Riparian Wetland Assessment (MRWA), Proper Functioning Condition (PFC), and Riparian Cover Board. The MRWA inventories and measures riparian vegetative species composition, cover, vigor and/or regeneration. The Riparian Cover Board monitoring method measures changes in woody vegetation cover. Prior to the Interdisciplinary team's assessment, BLM personnel re-read established Cover Board plots and inventoried the perennial streams in the watershed using the MRWA method. Seasonal staff assessed 55 stream reaches during the 2005 and 2006 field seasons. The PFC assessment evaluates stream geometry, channel dimensions, hydrological function, riparian vegetative conditions as well as soil erosion and deposition. In June and July of 2006 the entire IDT walked most of the stream reaches within the watershed and completed PFC evaluations on each. The MRWA and Cover Board monitoring data (where available) was evaluated and considered before making a functionality assessment call on each stream.

It can be difficult to distinguish between wetlands and riparian areas. Riparian areas lack the amount or duration of water usually present in wetlands, yet are wetter than adjacent uplands. They lie midway between wetlands and uplands in terms of moisture regimes. Riparian species may be "wetland" species or they may be true upland species expressing greater vigor due to increased water.

Many of the reaches in the assessment area were originally described based upon mapped information, aerial photos, and USGS topography quad maps. Ground truthing has verified that a number of these reaches are dry washes, lack riparian soils or plants, and have subsequently

been removed from the stream/wetland inventory. After the elimination of some reaches and the addition of others, 63 reaches totaling 25 miles, numerous isolated springs, one lake and one pond were surveyed.

Findings for Riparian Health

The IDT concluded that riparian conditions along 12.3 stream miles is either PFC or FAR with an upward trend. The condition on 12.6 miles is FAR static, trend not apparent or downward or not functioning (NF). The riparian functional status of the streams is reported in Table 4, and illustrated in Figure 2 below. Riparian conditions are also shown on **Maps 3 and 4** at the end of the document.

Table 4: Riparian Functional Status

Hydrologic Unit	Major Stream	Tributary Stream or Spring	Allotment	BLM Reach ID	Vegetative Community Type Hanson et. al. 1995	PFC/FAR (upward trend)	NF/FAR (static, down, not apparent)
Ruby	Alder Gulch	Alder Creek Trib.	Cal Creek AMP #10507	RU275	CARNEB	0.80 miles	
		Browns Gulch	Mc Govern #00957	RU186	JUNSCO/CORSTO		2.16 miles
				RU290	JUNSCO/CORSTO	0.26 miles	
			Hungry Hollow #10491	RU277	PSEMEN/CORSTO		0.65 miles
				RU278	PSEMEN/CORSTO		0.53 miles
				RU289	PSEMEN/CORSTO	0.26 miles	
		Butcher Gulch	Cal Creek AMP #10507	RU280	POPTRE/CORSTO	0.48 miles	
				RU281	POPTRE/CORSTO		0.19 miles
		Daylight Creek	Cal Creek AMP #10507	RU282	PSEMEN/CORSTO		0.36 miles
		Slade Creek	Benchmark #20489	RU198	SALGEY/CARUTR		0.63 miles
		Threemile Creek	Cal Creek AMP #10507	RU279	POPTRE/CORSTO		0.15 miles
		Water Gulch	Cal Creek AMP #10507	RU283	CARNEB	0.22 miles	
			Cal Creek AMP #10507	RU287	CARNEB		0.09 miles
	California Creek	California Creek	Cal Creek AMP #10507	RU21	JUNSCO/CORSTO	2.13 miles	
				RU60	PSEMEN/CORSTO	0.32 miles	
				RU61	PSEMEN/CORSTO	1.32 miles	
		Harris Creek	Cal Creek AMP #10507	RU25	PSEMEN/CORSTO	0.61 miles	
	Granite Creek	Downey Creek	Downey Creek #20581	RU20	PICEA/CORSTO		0.31 miles
				RU233	PSEMEN/CORSTO	0.73 miles	
		Dulea Creek		RU56	SALGEY/CARUTR	0.27 miles	

Hydrologic Unit	Major Stream	Tributary Stream or Spring	Allotment	BLM Reach ID	Vegetative Community Type Hanson et. al. 1995	PFC/FAR (upward trend)	NF/FAR (static, down, not apparent)
		East Fork Granite Creek	Downey Creek #20581	RU195	PSEMEN/CORSTO	0.47 miles	
		Gibbs Creek	Ballard #0456	RU19	PICEA/CORSTO	1.4 miles	
				RU22	POPTRE/CORSTO	0.35 Miles	
			Dry Lakes #20526	RU235	SALGEY/CARUTR	1.0 miles	
		Granite Creek	Downey Creek #20581	RU23	POPTRE/CORSTO	0.33 miles	
			Dry Lakes #20526	RU234	POPTRE/CORSTO		0.43 miles
		Mill Gulch	Mill Gulch AMP #10475	RU24	PSEMEN/CORSTO	2.33 miles	
				RU53B	SALGEY/CARUTR		0.08 miles
				RU53U	SALGEY/CARUTR		0.48 miles
				RU67	PSEMEN/CORSTO	0.65 miles	
			Mill Gulch Isolated #20450	RU79	POPTRE/CORSTO		0.25 miles
	Indian Creek	Indian Creek	Funk #10478	RU46	POPTRI/CORSTO	0.73 miles	
	Mill Creek	Nonpareil Creek	Brandon Pasture #20481	RU113	CARUTR	1.0 miles	
		Spring Park Creek	Brandon Pasture #20481	RU52	SALGEY/CARUTR		0.53 miles
	Ramshorn Creek	Currant Creek	Ramshorn Creek #10552	RU74	PSEMEN/CORSTO		0.60 miles
		East Fork Granite Creek	Granite-Moore North #10427	RU209	PICEA/EQUISETUM		1.19 miles
		Sand Coulee	Sand Coulee #20679	RU286	CARNEB		0.50 miles
		Horse Creek	Sand Coulee #20679	RU2	POPTRE/CORSTO		0.93 miles
			Ramshorn Creek #10552	RU1	POPTRE/CORSTO		0.90 miles
				RU73	POPTRE/CORSTO	0.46 miles	
		Ramshorn Creek	Ramshorn Creek #10552	RU111	SALGEY/CARUTR	0.47 miles	
				RU276	PSEMEN/CORSTO		0.20 miles
				RU3	PSEMEN/CORSTO	1.64 miles	
				RU75	PSEMEN/CORSTO		0.28 miles
				RU76	JUNSCO/CORSTO		0.77 miles
				RU77	JUNSCO/CORSTO		0.65 miles

Hydrologic Unit	Major Stream	Tributary Stream or Spring	Allotment	BLM Reach ID	Vegetative Community Type Hanson et. al. 1995	PFC/FAR (upward trend)	NF/FAR (static, down, not apparent)
		RU 134 Spring RU135 Trib.	Wisconsin Creek #10501	RU134	SALBOO/CARUTR	1.0 acre	
				RU135	JUNSCO/CORSTO		0.10 miles
	Wisconsin Creek	Nugget Creek	Georgia Gulch #20348	RU34	PSEMEN/CORSTO	1.20 miles	
		Wet Georgia Gulch	Georgia Gulch #20348	RU35	POPTRE/CORSTO		1.1 miles
				RU132	POPTRE/CORSTO	1.15 miles	
				RU133	SALGEY/CARUTR	0.18 miles	
Madison	Madison River	Moore Creek	Granite-Moore North #10427	MA109	PICEA/EQUISETUM	1.08 miles	
				MA111	PICEA/CORSTO		1.15 miles
				RU288	PICEA/CORSTO	0.45 miles	
			Fletcher Moore #30428	MA1	PICEA/EQUISETUM	0.59 miles	
				MA110	POPTRE/CORSTO		0.34 miles
		Moran Creek	Cal Creek AMP #10507	RU68	POPTRE/CORSTO		0.4 miles
				RU263	JUNBAL		0.32 acres
		Postlewaite Creek	Benchmark #20489	RU201	SALGEY/CARUTR		0.47 miles
			Granite-Moore North #10427	RU200	SALGEY/CARUTR		1.07 miles
	Moore Creek	Fletcher Creek	South Daisy Creek #20399	MA2	PICEA/EQUISETUM	0.37 miles	
		Slade Creek	Virginia City Hill #10521	RU199	SALGEY/CARUTR		0.67 miles

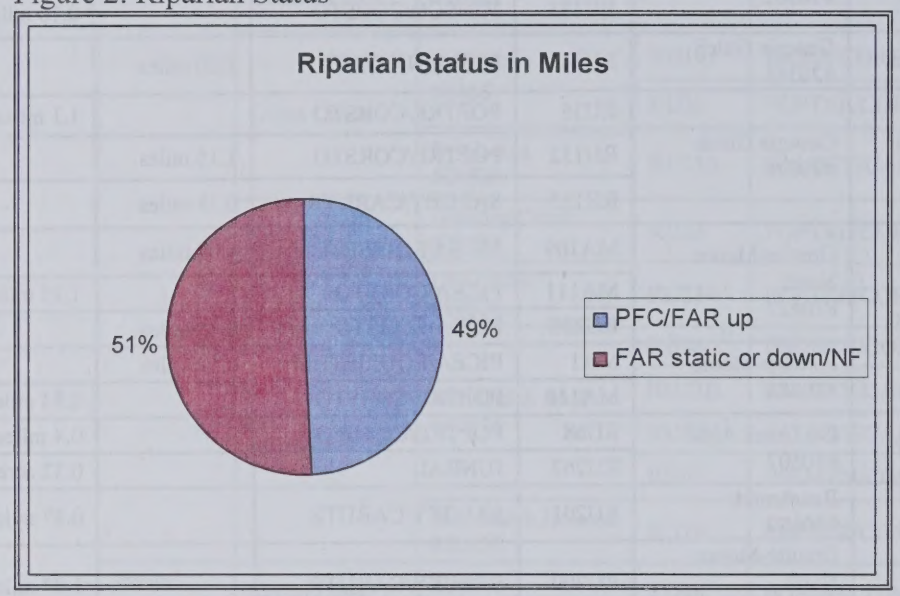
Table 5 provides the common name as well as the scientific name for the Hanson Community Type Abbreviations.

Table 5: Riparian Community Types

Abbreviation	Community Type
CARNEB	Nebraska sedge *(Carex nebrascensis)*
CARUTR	Beaked sedge *(Carex utriculata)*
JUNBAL	Baltic rush *(Juncus balticus)*
JUNSCO/CORSTO	Rocky Mountain juniper/red-osier dogwood *(Juniperus scopulorum/Cornus stolonifera)*
PICEA/CORSTO	Spruce/red-osier dogwood *(Picea engelmannii/Cornus stolonifera)*
PICEA/EQUISETUM	Spruce/horsetail *(Picea engelmannii/Equisetum)*
POPTRE/CORSTO	Quaking aspen/red-osier dogwood *(Populus tremuloides/Cornus stolonifera)*
POPTRI/CORSTO	Black cottonwood/red-osier dogwood *(Populus tricocarpa/Cornus stononifera)*
PSEMEN/CORSTO	Douglas fir/red-osier dogwood *(Pseudotsuga menziesii/Cornus stolonifera)*
SALBEB	Bebb willow *(Salix bebbiana)*

Abbreviation	Community Type
SALBOO/CARUTR	Booth willow/beaked sedge *(Salix boothii/Carex utriculata)*
SALGEY/CARUTR	Geyer's willow/Beaked sedge *(Salix geyeriana/Carex utriculata)*

Figure 2: Riparian Status



Analysis of Riparian Health

Resource concerns related to streams and wetlands observed by the IDT included: alteration of stream morphology (channel shape and gradient), vegetative composition, vegetative cover, structure and vigor of streamside vegetation (specifically aspen, willows and sedges), conversion of deciduous communities to conifer, noxious weed infestations in riparian zones and excessive sediment from roads, stream banks, and/or upstream disturbances such as active or abandoned mines.

Because the IDT did not have information or knowledge regarding the presence of Idaho sedge, a BLM designated sensitive species, in the Cal-Creek allotment until after the 2006 field season, the small depressional "pothole" wetland where is occurs was not inventoried or assessed. The IDT noted that one small pond and associated lentic wetland in the vicinity of stream reach RU68 (that flows out of Grassy Lake), has been impacted by livestock, is dominated by non-native herbaceous species and appears to be drying out. Field surveys conducted by the Montana Heritage Program have located a small community of Idaho sedge near this stream. Idaho sedge is palatable and populations associated with small wetlands such as the one in the STR assessment area are particularly at risk from heavy livestock grazing prior to the plants going to seed.

Increasing juniper cover is adversely affecting deciduous riparian habitat on most streams in the STR assessment area. Historic mining activity is extensive and has influenced habitat conditions in many riparian areas as described above under Affected Environment. Vegetation recovery of

these areas has been dependent on the extent and frequency of the mining disturbance as well as the intensity of subsequent uses such as livestock grazing, recreational activities and road building and maintenance. These human caused disturbances, along with the exclusion of fire as a natural disturbance, have enhanced juniper development over other deciduous shrubs and trees. This change is most pronounced on the lower elevation stream reaches and/or those closest to Virginia City. Where juniper has increased to the exclusion of most other riparian vegetation, channel stability has been degraded and channel incisement (down cutting) has reduced the extent of riparian habitat. The heaviest noxious weed infestations are also found along lower elevation reaches closest to Virginia City. Stream reach specific data and identified resource concerns are available at the Dillon Field Office

Recommendations for Riparian Health

1. Because the IDT recognizes that BLM authorized livestock grazing is contributing to unacceptable riparian habitat conditions, new Allotment Management Plans (AMPs) should be developed for the Benchmark, Cal-Creek AMP, Fletcher-Moore, Granite-Moore North, Mill Creek Isolated, Ramshorn Creek, Sand Coulee, and Virginia City Hill allotments. Changes in timing, duration, frequency and/or intensity of grazing will be considered. Rest and/or deferment may be incorporated into grazing plans in these allotments. Salting locations, herding, and/or applicable range improvement projects should be examined to determine how these tools can be used to mitigate riparian issues.

2. Address site specific concerns as needed on allotments in which the riparian areas are generally healthy or improving.

3. Implement management measures that will improve streambank stability and increase willow and sedge cover where these concerns were identified, whether the cause is current livestock management or conifer expansion.

4. Develop projects and/or strategies to protect, manage or promote aspen. Projects to promote aspen may include prescribed burning and/or mechanical treatments. The BLM's goal is to maintain or increase aspen throughout the watershed.

5. Work with Madison County, Ruby Conservation District, Ruby Watershed Committee, DEQ and other interested parties to address riparian concerns that cross administrative boundaries.

6. Within budgetary constraints, increase the use of Integrated Weed Management tools to treat noxious weeds within and adjacent to riparian habitat where weeds are contributing to FAR conditions.

7. Implement management designed to mitigate impacts in lentic wetlands from current livestock grazing and trailing on public lands in section 5 (Township 7 South, Range 2 West) where concerns were noted. Inventory additional wetlands in this area to verify the presence of the sensitive species Idaho sedge and assess their habitat. If current management is adversely impacting Idaho sedge mitigation actions will be taken protecting and enhancing occupied and

potential habitat. Changes in timing, duration, frequency and/or intensity of livestock grazing will be considered, or specific areas may be excluded from livestock grazing.

Water Quality

Western Montana Standard #3: *"Water quality meets State standards"*

Affected Environment

See Riparian and Wetland Areas section above.

Analysis and Recommendations for Water Quality

Findings for Water Quality

According to Montana's Draft 2006 Integrated 303d/305b Water Quality Report, non point source pollution accounts for 90% of the stream and 80% of the lake impairments statewide. Atmospheric deposition is the leading cause of impairment to lakes. Stream nonpoint source pollution, however, is directly related to land use. Farms and ranches cover two thirds of the state and agriculture is Montana's leading industry. Pollutants from agricultural nonpoint sources include sediment, nutrients, salinity, thermal impacts, bacteria and pesticides. Grazing in riparian areas is Montana's second leading source of stream impairment.

Montana DEQ has been in the process of assessing the condition of streams and developing a water quality restoration plan for the Ruby River Watershed. In March of 2006, Montana DEQ posted a draft plan on their website. The plan listed assessment findings and proposed strategies for addressing impacts. Land use in the South Tobacco Roots Watershed includes placer, dredge and hardrock mining, timber harvesting, and farming and ranching. Agricultural non-point sources of pollution are sedimentation and nutrients, and mining impacts result in pollution from heavy metals. In addition, sediment running off unpaved roads was a major concern. The Ruby River is listed as an impaired stream as are many of its tributaries. Table 6 lists the impaired uses, probable causes and probable sources for streams within the STR in the 2006 Report.

Table 6. Montana DEQ 303-d listed Streams in STR

Name	Beneficial Uses [1]	Probable Sources of Impairment
Ruby River	AL[3], CWF[4], PCR[5]	Grazing in Riparian Zones Irrigated Crop Production Flow Alterations from Water Diversions
Alder Gulch[2]	AL[3], CWF[4], PCR[5]	Dredge Mining Forest Roads (Road Construction and Use) Grazing in Riparian Zones Mill Tailings Mine Tailings Placer Mining
California Creek	AL[3], CWF[4]	Grazing in Riparian Zones Placer Mining

Currant Creek[2]	AL[3], CWF[4]	Grazing in Riparian Zones Irrigated Crop Production Mine Tailings Unspecified Unpaved Road or Trail
Indian Creek	AL[3], CWF[4], PCR[5]	Channelization Grazing in Riparian Zones Unspecified Unpaved Road or Trail
Mill Creek	AL[3], CWF[4], PCR[5]	Grazing in Riparian Areas Irrigated Crop Production Impacts from Abandoned Mine Lands (Inactive) Unspecified Unpaved Road or Trail
Ramshorn Creek[2]	AL[3], CWF[4], PCR[5]	Channelization Grazing in Riparian Zones Irrigated Crop Production Mine Tailings Placer Mining Unspecified Unpaved Road or Trail
Wisconsin Creek	AL[3], CWF[4], PCR[5]	Grazing in Riparian Areas Irrigated Crop Production Mine Tailings Unspecified Unpaved Road or Trail

[1]Partial Support, [2]Non Support, [3]Aquatic Life, [4]Cold Water Fishery, [5]Primary Contact Recreation

The BLM understands that non-point source pollution needs to be addressed for waters of the State regardless of whether they are meeting or are not meeting water quality standards and that non-degradation rules apply to waters that meet state standards.

For the STR watershed assessment, the IDT used a combination of methodologies to evaluate the watershed characteristics and the stream systems. Upland, riparian and forest health assessments were used to determine how BLM management is affecting water quality. Upland indicators focus on erosion and soil loss. Forest health indicators look at encroachment of conifers and loss of willow and aspen. Riparian indicators evaluate channel dimensions, patterns and profiles, bed materials, access to floodplains, species composition and condition of riparian vegetation. The assessment team looks for evidence of current and historic mining, abandoned beaver dams, erosion from roads. Generally, the assessment team found non-point pollution sources similar to statewide findings as well as the more specific findings noted in the draft Ruby River Watershed Water Quality Restoration Plan.

Recommendations for Water Quality

1. Continue working with Montana DEQ and local Watershed Committees in the development and implementation of water quality restoration plans. The "Ruby River Watershed Water Quality Restoration Plan and Total Maximum Daily Loads" document will likely be approved in the next few months.

2. Implement Best Management Practices to address non-point source pollution. The major land uses on BLM lands are grazing, timber harvesting, forest health, mining and roads associated with these activities.

Air Quality

Western Montana Standard #4: *"Air quality meets State standards"*

Affected Environment

South Tobacco Roots Watershed is located within the Montana/Idaho Airshed Management Area. Twin Bridges, Sheridan and Virginia City are located on the western and southern slopes of the Tobacco Root Mountains. Ennis is located off the eastern slopes. Predominant winds in southwest Montana are out of the northwest, west and southwest. Air Quality in Southwest Montana and South Tobacco Roots is excellent. Air Quality issues develop predominantly during wildfire season.

The closest Ambient Air Quality monitoring site to the assessment area is in Idaho Falls, Idaho. A particulate matter (PM) 2.5 emission is a pollutant level of concern and the State of Montana is charged with developing a strategy to address PM 2.5 emissions. As indicated above, most PM 2.5 emissions are generated by fire. Butte is the closest Montana State PM 10 non-attainment Area.

The 1977 Amendments to the Clean Air Act resulted in the development of Air Quality Classes under the provisions of Section 160, Prevention of Significant Deterioration. The South Tobacco Root Watershed is located within a Class II airshed. Red Rock Lakes National Wildlife Refuge, located south of the assessment area, is Class I.

Analysis and Recommendations

Procedure to determine conformance with Standard

The Clean Air Act of 1990 as amended (42 U.S.C. 7401 et seq) requires the BLM to protect air quality, maintain Federal and State designated air quality standards, and abide by the requirements of State Implementation Plans.

The Environmental Protection Agency has delegated the authority to implement the provisions of the Clean Air Act to the State of Montana. Determination of compliance with air quality standards is the responsibility of the State of Montana.

Findings for Air Quality

For the major part of the year the Air Quality Standard is met throughout southwest Montana including the South Tobacco Root Watershed assessment area. Air Quality can become an issue during wildfire season. However, generally all of southwest Montana is in attainment, meaning that the air resource meets or exceeds all National Ambient Air Quality Standards.

Analysis of Air Quality

Air quality issues in the planning area center mainly around smoke. Smoke contributors in the planning area include wildfire, prescribed fires, private debris burning, agricultural burning, slash burning, and wood burning stoves and fireplaces. Wildfire can produce short-term adverse effects on air quality. Air quality and visibility can deteriorate due to temporary air stagnation during wildfire events, which are most common during the months of July, August, and September. Concerns regarding human health revolve around smoke from wildland and prescribed fire.

The 1998 Interim Air Quality Policy for Wildland and Prescribed Fires requires states to develop smoke management plans. The Montana/Idaho Airshed Group developed the Montana/Idaho Smoke Management Program. Prescribed burning is done in accordance with the Montana/Dakotas Fire Management Plan and is coordinated with MT DEQ and the Montana/Idaho Airshed Group. During prescribed fire season, the Smoke Monitoring Unit supports the Montana/Idaho Airshed Group to prevent or reduce the impact of smoke on area communities, especially when that smoke could contribute to a violation of national air quality standards. During the summer wildfire season, the Smoke Monitoring Unit assists state and local governments in monitoring smoke levels and providing information about smoke to the public, firefighters, and land managers.

Recommendations for Air Quality

1. Continue to follow Burn Plans and to coordinate with the Smoke Monitoring Unit.

Biodiversity

Western Montana Standard #5: *"Provide habitat as necessary, to maintain a viable and diverse population of native plant and animal species, including special status species"*

Affected Environment

The foothills in the South Tobacco Roots watershed provide a broad distribution of forested habitats interspersed with a variety of sagebrush and riparian habitats. Increasingly widespread residential development within these habitats creates conditions and issues unique in the Dillon Resource Area. Wildlife species occurrence is consistent with the rest of the resource area, but seasonal wildlife use and distribution is influenced to a greater degree by human activity and increasing forest and woodland cover.

Sagebrush Habitats and Sagebrush Dependent Species

A wide variety of sagebrush habitats are found in the STR watershed. Basin big sagebrush is found in most dry drainages and along the fringes of many riparian zones. Much of this habitat

type has been affected by mining activity, livestock grazing, subdivision and road building. Substantial private land areas of basin big sagebrush have been converted to agricultural uses or subdivisions. Mountain big sagebrush occurs at higher elevations and has been significantly affected by Douglas-fir and juniper expansion. Wyoming big sagebrush is not common in the STR and is found only in the western part of the assessment area. Three-tip sagebrush and black sagebrush are widespread from Granite Creek to Quaking Aspen Creek, particularly in the Water Gulch area. Other sagebrush-associated shrub communities include black greasewood, chokecherry, snowberry, and mock orange which provide local habitat diversity for a variety of wildlife species.

Prescribed fires conducted during the past twenty years in sagebrush communities have resulted in localized loss of sagebrush canopy. Prescribed burns on public lands in the early 1980's in Indian Creek and Slade Creek have recovered very little sagebrush canopy. A Forest Service prescribed burn adjacent to the Indian Creek burn shows the same lack of mountain big sagebrush recovery. The Herman Gulch fire still has less than 10% sagebrush canopy while some juniper within the burn unit survived and is thriving. A burn in basin big sagebrush on state lands in lower Wet Georgia Gulch over 20 years ago has recovered approximately 15% canopy, but with a much shorter structure and a weed-dominated herbaceous composition. Private land sagebrush treatments in upper Granite Creek and Daylight Creek have significantly reduced sagebrush canopy. Private burns in Slade Creek and on Copper Mountain have shown some sagebrush recovery but with increases in three-tip sagebrush and cheatgrass. Sagebrush habitat on public and private lands that was treated in the late 1970s on Virginia City Hill (north of highway 287) has recovered to approximate pre-burn canopy and composition.

In the past, the south front of the Tobacco Roots was winter habitat for mule deer. Today, increasing forest cover, competition from elk and white-tailed deer, and habitat fragmentation and disturbance from residential development, has reduced the extent of winter use.

Sage grouse have declined substantially in the STR since the 1970's. Only two sage grouse leks have been documented on public land, one east of Laurin, the other in Water Gulch. However, neither of these leks has been occupied for several years. Although sage grouse are still present in reduced numbers in the portions of the STR, the only occupied habitat appears to be east of Granite Creek in the Virginia City Hill vicinity and southwest to Axolotl Lakes.

Surveys for pygmy rabbits in the STR during the 1990's did not locate any occupied habitat, and the area was considered to be on the fringe of suitable habitat for this species. However, subsequent surveys by Montana Natural Heritage Program and BLM since 2000 have documented occupied habitat in Wet Georgia Gulch, Indian Creek, Granite Creek, Herman Gulch, and Alder Gulch.

Riparian, Aquatic and Wetland Habitat and Associated Species

The majority of riparian habitats in the STR are Douglas-fir, juniper and aspen riparian types. The taller structural component of these communities supports a broader array of species compared with habitats dominated by shrubs or herbaceous vegetation. Wisconsin Creek, Noble

Fork, Indian Creek and Ramshorn Creek are steep cascading stream systems that are very stable with conifer-dominated habitat types that provide excellent habitat conditions for wildlife.

Juniper is an increasing component of deciduous riparian habitat on most streams in the STR assessment area. Juniper provides valuable habitat diversity in riparian areas until its density begins to displace other woody and herbaceous species. This usually occurs in areas that have sustained some prolonged or intense disturbance that provides juniper a long-term competitive advantage over other riparian species.

Conifer Forest Habitat and Associated Species

Dry Douglas-fir and juniper stands have expanded in recent decades and spread into adjacent sagebrush habitats. This enlargement of timber stands has increased wildlife security habitat and created linkage corridors to larger blocks of forested habitat on Forest Service lands. However, this habitat improvement has been compromised in some areas by an increase in road density.

Noxious Weed and Cheatgrass Infestations

Noxious and invasive weeds are one of the primary resource concerns within the South Tobacco Roots Watershed. Weeds affect land health in varying degrees in riparian and upland habitats. They also reduce biodiversity in isolated areas while posing widespread risk to the biodiversity of many additional locations in the watershed. Historic mining (dredging) along most streams in the watershed, as well as small dispersed areas of the uplands, combined with mining infrastructure (roads, timber harvest, etc), caused large scale soil disturbances providing noxious and invasive species an opportunity to establish. Because of the aggressive and competitive nature of these noxious weeds, they have spread throughout the watershed, primarily along road systems, utility corridors, and other disturbed areas, but are also beginning to encroach into some undisturbed upland areas.

The two noxious weeds of greatest concern in the STR watershed are spotted knapweed (*Centaurea maculosa*) and dalmation toadflax (*Linaria dalmatica*).

Spotted knapweed is an aggressive perennial invader and a prolific seed producer. Spotted knapweed seeds remain viable for up to ten years. It is found in large infestations scattered throughout the watershed especially along roads, mining areas, dredged streams and other disturbance areas. Because of where it is found, the potential is high for knapweed to be spread by vehicles, livestock, wildlife, recreation and other activities.

Dalmatian toadflax, an aggressive perennial introduced from southeastern Europe as an ornamental, is difficult to control due to a waxy leaf and an extensive and deep root system. Large, scattered infestations of dalmatian toadflax are found in the Brandon Pasture allotment and smaller more scattered infestations are found in other areas of the watershed. Due to its aggressive nature and ability to reproduce by both seeds and creeping root stalks the potential for spread is high.

Other invasive noxious weeds present in isolated locations within the STR watershed are houndstongue *(Cynoglossum officinale)*, Hoary cress or Whitetop *(Cardaria draba)*, Black henbane *(Hyoscyamus nigar),* musk thistle *(Carduus nutans)* and Canada thistle *(Cirsium arvense)*.

Since 1989, the BLM has been involved in cooperative weed control efforts with Madison County. Throughout this period, the goal has been to prevent new noxious weed infestations and reduce or eradicate existing infestations on public lands within Madison County using Integrated Pest Management (IPM).
Table 7 shows the herbicide treatments applied in the South Tobacco Roots Watershed during the past three years.

Table 7: Weed Treatments

Year	Acres Treated	Acres Inventoried
2004	75	900
2005	90	1,000
2006	120	1,500+

Through a cooperative project, involving the BLM, Madison County and various private landowners, over 100 acres heavily infested with noxious weeds were aerially treated in Wet Georgia Allotment in 2004, over 200 acres in Granite Creek Allotment in 2005 and more than 200 acres in the Wet – Dry Georgia gulch area in 2006. Biological controls such as the seed head fly (*Urophora* sp), knapweed root-boring weevil (*Cyphocleonus achates*), knapweed flower weevil (*Larinus minutus)*, and toadflax stem weevil (*Mecinus janthinus)* are present at release sites within the STR Watershed.

Cheatgrass *(Bromus tectorum)* is established and spreading into disturbed areas throughout the watershed. Relatively large infestations were observed by IDT members in some of the major stream corridors and adjacent uplands, specifically on south or west facing slopes. Cheatgrass is an extremely competitive early cool season species that flourishes in disturbed sites. Old mining sites, roads, construction locations, burned areas and other disturbed areas have allowed cheatgrass to become established. Once established, cheatgrass, a winter annual, has the potential to change (shorten) the fire return interval because it dries out in early summer and becomes a fine, flashy fuel. Cheatgrass tends to form monocultures. It currently affects habitat quality and biodiversity in localized areas, but the seed source is present throughout most of the watershed, so could potentially spread into new areas of natural and/or human caused disturbance.

Fish Streams

The South Tobacco Root Assessment area has 13 perennial streams on public land supporting cold water fisheries. Common sport fish species in the assessment area are brook trout (*Salvelinus fontinalis)* and rainbow trout (*Oncorhynchus mykiss*). These non-native species were introduced into the area in the early 1900's or before. Brook trout are the most common salmonid found in the assessment area, occurring in most perennial waters capable of supporting a fishery. Rainbow trout are incidentally to commonly found in the lower reaches of several streams. On occasion, brown trout (*Salmo trutta*) are caught in the lower reaches of Granite Creek and non native Yellowstone cutthroat trout are caught in the lower portions of Wisconsin Creek.

Fish streams within the assessment area do not generally support popular recreational fishing. Portions of Granite Creek support a small sport fishery for rainbow trout and brook trout. Wisconsin Creek provides approximately 50 angler use days per year and Ramshorn and Indian creeks provide an additional 100 or so angler days (MFWP 2004). Several other streams likely support light fishing use as well, but were not reported through MFWP angler use surveys.

Native species such as mountain whitefish (*Prosopium Williamsoni),* longnose sucker (*Catostomus catostomus),* white sucker (*Catostomus commersoni)*, mottled sculpin (*Cottus bairdi*) and westslope cutthroat trout (*Oncorhynchus clarki lewisi)* are found in portions of some streams.

Fish habitat conditions on streams within the South Tobacco Root Assessment area range from fair to good. Impacts to fish habitat are primarily from past mining activities and current livestock grazing. The greatest threat to native species such as the westslope cutthroat trout is extirpation from non native brook trout and hybridization from non native rainbow trout. Table 8 describes the fishery inventory in the watershed.

Table 8: STR Fisheries Inventory

Stream	Species Present
Granite	Brook/Rainbow trout
Harris	WCT / 100% purity
California	WCT95%-100%/Brook trout
Mill Gulch	WCT 94%/ Brook trout
Wisconsin	WCT/97% Brook/Rainbow
Ramshorn	WCT/98%
Indian	WCT/96%
Nugget	WCT/91%
Currant Creek	Brook trout/ WCT 98%
Gibbs	Brook trout
Downey	Brook trout

Special Status Fish

Genetically pure westslope cutthroat trout (WCT) have drastically declined in the planning area to a few small populations located in Harris Creek and the headwaters of California Creek. The WCT in Montana is currently listed as a special status species. Most populations on BLM in the South Tobacco Root Assessment area are characterized by small isolated populations found in headwater habitat. Remaining pure populations are a result of some form of barrier that has prevented introgression by rainbow trout. Seven streams in the STR assessment area have WCT populations. The upper reaches of California and Harris Creeks support a 100% pure WCT population. Wisconsin, Ramshorn, Indian, Nugget, Mill Gulch and lower California Creeks support hybridized populations. Horse Creek is listed as supporting a WCT population, however, BLM sampling inventories in 2006 failed to collect any westslope cutthroat on public land. WCT may still persist within historic areas and in areas outside the sampling sections. Sampling efforts may have failed to collect WCT due to very low numbers, and they may still be present upstream on National Forest lands.

Special Status Plants

None of the plants currently listed as endangered or threatened under the Endangered Species Act are known to be growing on BLM lands in the Dillon Field Office. Fifty sensitive plant species inhabit BLM lands in the Dillon Field Office. Suitable habitat exists for several of these species, but to date only one has been found on BLM lands within the STR assessment area. A discussion of this species is included under the "Riparian and Wetland Areas" sections of this assessment. Extensive field searches for sensitive plants haven't been conducted within the assessment area, so it's quite probable that more sensitive species will be discovered if and when botanical surveys are completed in conjunction with proposed projects requiring surface disturbance.

Findings, Analysis and Recommendations

Procedure to determine conformance with standard

This standard is an overall assessment of biodiversity and wildlife habitat. The present state of each allotment and habitat type was compared to the natural and historic condition. The indicators described under the S&G definition of the standard were used to determine if this standard was met. The condition/function of the other standards, specifically uplands and riparian, were considered to determine whether or not Standard #5 is being met.

The ID Team considered the range of natural variation within this ecosystem as well as the species composition, condition of available habitat, and forest health to determine if desired biodiversity is being achieved. The wildlife habitat niches expected are: grasslands (short and mid grasses), bare ground, small streams, riparian/wetlands, sagebrush steppe, conifer forests, aspen stands, and various mixes of these components. Providing habitat for special status plant and animal species is critical to meeting the biodiversity standard.

Findings and Analysis for Biodiversity

Sagebrush Habitat

Substantial fragmentation of wildlife habitat is ongoing in the STR. Residential development on private land is resulting in habitat conversion. New road construction to access the developed areas is compounding the loss of habitat by influencing wildlife behavior and uses beyond the actual area of conversion or concentrated use.

Big game movements are widespread across public lands in the STR, particularly during the winter. However, suitable big game winter habitat is becoming increasingly confined by subdivision, roads, yearlong human activity and increasing forest cover. As habitats are reduced wildlife movement between remaining suitable habitats becomes an issue of concern. Fences designed to allow big game migration should be a BLM management priority.

Increasing forest cover, competition from expanding elk winter use, and habitat fragmentation and disturbance from residential development has reduced the extent of mule deer use during the winter. Seasonal competition with increasing populations of white-tailed deer over the past 20 years is also impacting mule deer herds in the STR.

Protection and maintenance of remaining suitable public land sagebrush habitat is important for mule deer, sage grouse, pygmy rabbit and other sagebrush-dependent wildlife species. The only relatively continuous suitable sage grouse habitat in the assessment area extends from upper Water Gulch eastward across Virginia City Hill and into Moore Creek and Moran Creek. However expanding conifer cover, and sagebrush treatments on private lands between Granite Creek and Virginia City Hill, have reduced available habitat for sage grouse within this key area. Identification of leks and remaining seasonal habitat that supports these grouse should be a wildlife priority in the STR.

Primary sagebrush issues by allotment

<u>Georgia Gulch</u>

Knapweed and cheatgrass are prevalent throughout the Wet Georgia watershed with poor herbaceous composition in sagebrush communities. Livestock trailing and grazing is impacting basin big sagebrush communities along the creek reducing structural diversity. These conditions are reducing habitat suitability for elk and mule deer winter use and potential pygmy rabbit occupancy.

<u>Copper Mountain</u>

Cheatgrass is increasing in disturbance areas, often expanding from burned areas, logging and road building on adjoining private lands. The amount of open sagebrush habitat is being reduced by Douglas-fir expansion. This increase in canopy may reduce habitat suitability for spring elk calving use as less open sagebrush/herbaceous habitat is available, but on the other hand provides increased fall security cover.

Ballard

Douglas-fir expansion throughout sagebrush habitat has provided additional fall habitat security for deer and elk. However, this increase in canopy may reduce habitat suitability for spring elk calving and mule deer winter use as less open sagebrush/herbaceous habitat is available.

Virginia City Hill, California Creek, Dry Lakes, Benchmark

Cumulative sagebrush fragmentation on private lands within and adjacent to these allotments is reducing the availability of suitable sage grouse, mule deer, and pygmy rabbit habitat.

Hungry Hollow

Heavy historic grazing use and juniper expansion on the Section 25 tract have significantly reduced sagebrush and herbaceous cover, and potential wildlife use. Knapweed is increasing in the area. Habitat conditions in the adjacent McGovern and Baker Summit allotments indicate a much higher productivity potential.

Riparian Habitat

The density of Douglas-fir is increasing on most streams capable of supporting this riparian habitat type within the STR assessment area. Consequently, deciduous woody canopy and understory vegetation density is decreasing, as is the diversity of the wildlife species dependent upon this habitat. This change in wildlife abundance and diversity is expected to continue as the transition from willow and aspen to Douglas-fir habitat progresses. During this transitional period, or during attempts to reverse this process, these areas are particularly vulnerable to degradation from disturbances that remove vegetative cover or impact streambanks.

Increasing juniper cover is adversely affecting deciduous riparian habitat on most streams in the STR assessment area. Extensive past mining activity in the STR has influenced habitat conditions in many riparian areas. However, the current structure and composition of these riparian communities is dependent upon the extent of more recent mining disturbances, road building/maintenance, and the intensity of recent livestock grazing. Continuing disturbances are enhancing juniper development over deciduous shrubs and trees. Where juniper is increasing to the exclusion of most other riparian vegetation, channel degradation has reduced the extent of riparian habitat, compromising wildlife values. This condition is most pronounced on Harris Creek, several tributaries to Ramshorn Creek, lower Slade Creek, and Postlewaite Creek.

Primary riparian issues by allotment

Georgia Gulch

Wet Georgia Creek – Channel degradation has reduced the extent of riparian habitat resulting in a high percent mature/dead/decadent willow in the lower reach. Juniper is increasing in density in all reaches.

Ramshorn Creek

Horse Creek – Channel degradation has reduced the extent of riparian habitat resulting in a high percent mature/dead/decadent willow in the lower reach. Juniper is increasing in density in all reaches. Fences along the road in Horse Creek are a barrier to wildlife movement and are aggravating livestock impacts to riparian habitat in localized areas.

Ramshorn Creek tributaries – Aspen and willow are being replaced by juniper on most of the north side tributaries to Ramshorn Creek.

California Creek

Harris Creek, California Creek, Wakefield Creek, Quaking Aspen – Increasing density of juniper canopy in all of these streams is reducing plant community diversity and wildlife uses.

Browns Gulch– Extensive occurrence of noxious weeds adjacent to the riparian area, increasing juniper canopy and mass wasting banks are compromising habitat potential and wildlife use.

Water Gulch – The riparian community is comprised exclusively of disturbance-induced species and nearly all deciduous woody vegetation has been eliminated. Excessive livestock utilization resulting in continual bank disturbances is inhibiting habitat recovery.

Butcher Gulch, Daylight Creek, Three-mile Creek, Alder Gulch tributary – Riparian habitat is showing signs of improvement in plant community composition and vigor after rest from livestock grazing but recent intense grazing treatments have compromised some of that recovery.

Grassy Lake collection pond – Heavy livestock utilization is resulting in hoof disturbances (pugging) to the wetland/riparian zone adjacent to the collection pond north of Grassy Lake. Vegetation composition is dominated by disturbance-induced species.

Ballard

Gibbs Creek - Declining willow and aspen composition has significantly reduced structural diversity and potential wildlife use.

Downey Creek

Dulea Creek, Downy Creek – Increasing Douglas-fir canopy and declining willow/aspen composition has reduced structural diversity and potential wildlife use.

Virginia City Hill/Benchmark

Slade Creek – Heavy livestock utilization, causing severe bank disturbances, is altering vegetation composition and structure, allowing dominance by disturbance-induced herbaceous species and juniper.

Benchmark/Granite Moore North

Postlewaite Creek, Moore Creek tributaries – Heavy livestock utilization, resulting in bank alterations, is changing vegetation composition and structure, allowing dominance by disturbance induced herbaceous species, musk thistle, spotted knapweed and juniper.

Fletcher Moore

Moore Creek – Heavy browsing on willow/aspen regeneration is limiting habitat potential and structural diversity.

Fisheries Habitat

Riparian, wetlands, and fishery habitat issues and concerns are discussed in the Riparian section of this report. Fishery habitat in many streams in the STR is being impacted by changes in stream morphology, vegetative composition and cover, conifer encroachment into riparian communities, noxious weed infestations, elevated sediment inputs and impacts from livestock grazing.

Recommendations by the IDT for mitigating resource concerns in the riparian areas associated with the streams in the STR will also address fisheries habitat issues.

Primary Fisheries Issues by Stream

Harris Creek

Sediment entering the stream from the road crossing and channel degradation from historic mining is likely impacting spawning success for WCT. Increasing density of conifers in the riparian zone is causing a declining the willow and aspen composition which may affect stream productivity.

California Creek

Historic mining within the drainage has caused channel degradation which is contributing to unstable banks. Increasing juniper in the riparian zone is causing a decline in willow/aspen composition which could affect stream productivity.

Wisconsin Creek

Sediment from the adjacent road and channel degradation from historic mining is likely impacting spawning success for WCT. Non native brook trout are a major threat to the persistence of native WCT.

Ramshorn Creek

The sediment coming into the system from the county road that runs adjacent to the creek is likely impacting spawning habitat negatively.

Granite Creek

The unstable banks, channel over widening and excessive sediment inputs-all attributable to livestock grazing- combined with the loss of woody riparian vegetation are having a negative impact on spawning habitat.

Currant, Gibbs and Downey Creek

The Declining willow and aspen composition in the riparian zones associated with these streams has reduced vegetative productivity and stream bank stability.

Forest Habitat

Management of potential wildfire and fuels are the primary wildlife habitat concerns in the STR watershed. The increasing distribution and density of Douglas-fir and juniper has enhanced fall security cover, but subdivision development and road use, is restricting seasonal uses by elk and mule deer in some areas. Increasing herbaceous cover on many private lands, and large quantities of dead/dying timber throughout the watershed, is creating a significant fire hazard that potentially may have widespread impacts on wildlife habitats. The rising density of residential structures and roads into some areas of the watershed compounds the risk.

Primary forest wildlife habitat concerns are extensive areas of dead/dying Douglas-fir in Wisconsin Creek and from Mill Gulch eastward to Granite Creek. Also, increasing expansion and dominance by juniper at lower elevations from Virginia City and Alder Gulch westward to Sand Coulee and Baker Summit are impacting wildlife habitats.

Recommendations for Biodiversity

1. Modify existing barrier fences wherever they occur. Construction of new fences, even to "wildlife-friendly specifications," should be evaluated as potential restrictions to wildlife movement.

2. Initiate sagebrush habitat inventory to identify important sage grouse seasonal habitats with emphasis on locating active leks and brood-rearing habitats.

3. Manage juniper-dominated riparian habitats to restore deciduous woody species. Manage herbaceous composition to reduce disturbance-induced species.

4. Manage Douglas-fir habitats to maintain security and thermal cover values in important fall/winter habitats between Wisconsin Creek and Mill Gulch. Rehabilitate elk calving habitats

on Copper Mountain and from Mill Gulch to Granite Creek by restoring open sagebrush habitats that are currently dominated by Douglas-fir.

5. Manage juniper-dominated habitat throughout the STR to restore sagebrush and herbaceous composition.

6. Restore low to mid-level aspen communities currently dominated by Douglas-fir.

7. Coordinate closely with forest health and fuels reduction treatments (commercial and non-commercial timber harvest and prescribed fire) to mitigate noxious weed and cheat grass spread.

8. Investigate opportunities to exchange the large, isolated block of public land in the Fletcher-Moore allotment (T5S R1W Sec 23, 25, 26 and T5SR1E Sec 30) for private lands adjoining other public lands and National Forest in upper Fletcher Creek.

Recommendations for Weeds

1. Divide the watershed into three sections and aggressively treat noxious weeds in each area on a three year rotation schedule.

3. Request funding from abandoned mine lands money and other sources to treat infestations on abandoned historic mining areas.

4. Actively seek corporate and private landowner participation to help control weed spread and reduce existing infestations.

5. Request that utility and other right-of- way grant holders control noxious weeds within the ROW, per stipulations on their ROW grant. Follow up to ensure noxious weeds are treated in these areas.

6. Concentrate all initial chemical treatments on the main vectors for weed spread such as roads, utility corridors, trails, streams, camping areas, etc. Establish biological controls on larger established weed sites.

Forest Health and Fuels Management

Affected Environment

The South Tobacco Root Watershed can be divided into two sections to most accurately describe forest health and fuels management. The division is based on general topography and the resulting vegetation. The northern portion includes land north and east of Hwy 287, which roughly follows Alder Creek and the Ruby River. The general landscape is south to southwest-facing slopes that gain elevation moderately. South facing slopes and moderate elevation gain result in a large area favorable for the establishment and expansion of conifers suitable for the dry site conditions. Historically, this area was disturbed relatively regularly by fire. The

southern portion of the analysis area exhibits a more abrupt elevation increase and the slopes generally have a north to northeast aspect. Cooler, moister site conditions due to aspect and rapid elevation gain result in a large portion of this area to be favorable for forest development. Historic fire disturbance varied greatly, creating a mosaic of forest structure, density and species composition.

Both areas have experienced relatively rapid residential development in the past 10 to 15 years and this is expected to continue. As of August 2006, over 400 dwellings or structures are within one mile of BLM lands (Madison County GIS, 2006).

Forest and Woodland Condition

Low elevation woodlands are dominated by Rocky Mountain juniper, Douglas-fir and limber pine ranging in age from 20 to 80-plus years old. Old, remnant Douglas-fir are present in rockier areas and some display evidence of fire scarring. These low elevation woodlands also have intact stumps dating from timber harvest in the late 1880s to the early 1900s. The younger conifer age class bears no evidence of fire activity. A comparison of 1950's and 2001 aerial photography showed a 51% increase in conifer cover on a sample area north and east of Hwy 287. At higher elevations, Douglas-fir becomes the dominant species. Trees that are over 130 years old that were not cut in the 1800s to early 1900s often exhibit one or more fire scars. This pattern is repeated over the majority of the landscape. No fire scars were found on trees under 130 years old. With increasing elevation, Douglas-fir gives way to lodgepole pine dominated communities. These stands are generally under 130 to 150 years old and have little evidence of fire scarring. The highest elevation stands show little evidence of widespread fire activity. Aspen communities are very limited and the existing clones are rapidly declining. Aspen skeletons are commonly found in stands now dominated by Douglas-fir.

Riparian communities are a mix of hardwoods and conifer species either in the understory, or co-dominant with hardwoods. It is evident that Rocky Mountain juniper, and in some cases Douglas-fir, are overtaking these communities at lower to mid elevations.
Spruce budworm affects all species of conifers except Rocky Mountain juniper and lodgepole pine. Spruce budworm activity was at epidemic levels in the early 1980s and is currently at or nearing epidemic levels once again. However, the 1980s epidemic was less lethal than the current one. Tree mortality has become very evident in the past 12 to 18 months. This could reflect the combination of prolonged drought and the overstocked condition of these stands. Mountain pine beetle and Douglas-fir bark beetle have been present at endemic levels in lodgepole pine and Douglas-fir communities. However, the dramatic increase from 2004 to 2005 levels is a strong indicator of a potential epidemic. Balsam bark beetle, which affects subalpine fir, is present at its highest level since 1980 and could be considered to be at or near epidemic levels (Map 5: Forest Insect ad Disease).

Historical Fire Regimes

Fire exclusion, caused primarily by fire suppression and the removal of fine fuels by livestock grazing in the area since the 1860's, has changed the structure, density, and plant species composition within the lower grassland and the upland communities. The need for and

subsequent harvesting of forest products to support mining and agricultural activities in the late 1800's and early 1900's also greatly affected forest distribution, species composition and structure.

High intensity fires are now more likely to occur in areas that historically experienced more frequent low intensity fires. Due to increasing fuel continuity fires are also more likely to be of significantly greater size than those which historically occurred. Large scale high severity fires present risks to human life and property, watershed stability, fish and wildlife habitat.

In fire adapted ecosystems, recurrent fire is the dominant disturbance that affects vegetation patterns. One method to describe this disturbance is by using historical fire regimes (Table 9). The fire regime concept is used to characterize the personality of a fire in a given vegetation type, how often it visits the landscape, the type of pattern created, and the ecological effects. The historical fire regimes for the watershed are arranged based on fire severity and fire frequency.

Table 9: Historical Fire Regimes

Historical Fire Regimes	**Severity (% Overstory Replacement)**	**Fire Interval** (Years)	**Acres***	**Representative Ecosystem**
NL -- non-lethal	low - <20%	10 to 25	11,144	Dry pine, conifer encroachment and juniper forests
MS1 -- mixed severity, short interval	low - 20-30%	20 to 40	15,488	Lower Elevation Conifer Forests
MS2 -- mixed severity, long interval	mod - 30-80%	40 to 120	11,877	Shrublands, mixed conifer forests
MS3 – mixed severity; variable interval	variable - 10-90%	45 to 275	9,617	Higher elevation conifer forests
SR1 -- stand replacement, short interval	high - >80%	95 to 180	17,738	Certain lodgepole pine, dry Douglas-fir forests
SR2 -- stand replacement, long interval	high - >80%	200 to 325	32	High elevation whitebark pine, spruce-fir
SR3 -- stand Replacement nonforest	high - >80%	<35	135,862	Grasslands, many shrub communities

* The acreage calculation for each historical fire regime is based on the hydrologic unit scale. They include all ownerships to more accurately describe the current situation. Acreage discrepancies occur through calculations made in GIS.

Current Condition Classes

Fire Regime Condition Class (FRCC) is a classification of the amount of departure from the natural regime (Hann and Bunnell 2001). Coarse-scale FRCC classes have been defined and mapped by Hardy et al. (2001) and Schmidt et al. (2001), based on a relative measure describing

the degree of departure from the historical natural fire regime. This departure is from changes to one (or more) of the following ecological components: vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances (e.g. insect and disease mortality, grazing, and drought).

Three Condition Classes were developed to categorize the current condition with respect to each of the historic Fire Regime Groups. The three classes are based on low (Condition Class 1), moderate (Condition Class 2), and high (Condition Class 3) departure from the natural (historical) regime (Hann and Bunnell 2001, Hardy et al. 2001, Schmidt et al. 2001). Criteria used to determine current condition include the number of missed fire return intervals with respect to the historic fire return interval, and the current structure and composition of the system resulting from alterations to the disturbance regime. Low departure is considered to be within the natural (historical) range of variability, while moderate and high departures are outside. The relative risk of fire-caused losses of key ecosystem components increases as condition class designation increases.

The FRCC classifications for the South Tobacco Root Watershed based on the coarse-scale data are presented in Table 10. The data presented is the most current available and is valuable information to aid managers in estimating actual ground conditions. However, due to the limits of satellite-based imagery the coarse-scale estimates presented in Table 10 may differ from site-specific assessments made by members of the interdisciplinary team. For example, the coarse-scale assessments obtained through satellite imagery do not take into account finer scale factors influencing condition class such as recent insect and/or disease outbreak, individual stand structure and associated biodiversity issues.

Members of the IDT performed additional FRCC assessments for site-specific areas within the following potential natural vegetation groups: Sagebrush – Cool With Trees, Mountain Shrubland With Trees, Douglas-fir Interior Rocky Mountains, Interior West Subalpine Forest, and Interior West Upper Subalpine Forest. The IDT found that most xeric and forest/shrubland ecotone habitats were highly departed from historic conditions (Condition Class 3). Higher elevation habitats better corresponded with the coarse-scale assessment results.

Table 10. Fire Regime Condition Class

Condition Class	Description	Acres*	Example of Typical Management
1	Fire regimes are within a historical range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within a historical range. Fires burning in CC1 lands pose little risk to the ecosystem and have positive effects to biodiversity, soil productivity, and hydrologic processes.	44,518	Historical fire regime is replicated through periodic application of prescribed fire or through fire use.
2	Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals (either increased or decreased) resulting in moderate changes to one or more of the	134,662 (NOTE: Actual forested cover in this	Moderate levels of restoration treatments are required, such as a combination of prescribed fire with mechanical/hand treatment.

Condition Class	Description	Acres*	Example of Typical Management
	following: fire size, intensity and severity, and landscape patterns. Vegetation attributes have been moderately altered from their historical range. Wildland fires burning in CC2 lands can have moderately negative impacts to species composition, soil conditions, and hydrological processes.	condition class is approx. 7,819 acres. The remainder is sagebrush/ grassland.)	
3	Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals resulting in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range. Wildland fires burning in CC3 lands may eliminate desired ecosystem components, exacerbate the spread of unwanted non-native species, and result in dramatically different ecological effects compared to reference conditions.	11,697	High levels of restoration treatments, such as mechanical treatments, are required before fire can be used to restore desired ecosystem function. Intensive efforts, which may include seeding, herbicide application, biomass removal, and other types of rehabilitation, are required for CC3 lands.
Current conditions are a function of the degree of departure from historical fire regimes resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, and canopy closure. One or more of the following activities may have caused this departure: fire suppression, timber harvesting, grazing, introduction, and establishment of exotic plant species, insects or disease (introduced or native), or other past management activities (Laverty, Williams 2000).			

*The acreage calculation for each condition class is based on the hydrologic unit scale. They include all ownerships to more accurately describe the current situation. Acreage discrepancies occur through calculations made in GIS.

Based on the coarse-scale FRCC analysis, site-specific FRCC assessments, and historic photos of the area, the lower to mid elevation forested portions of the South Tobacco Root Watershed are moderately to severely departed from natural (historic) conditions.

Analysis, Issues and Recommendations

Map 5, South Tobacco Roots Forest Insect & Disease, shows a coarse-scale approximation of areas with forest health concerns within the South Tobacco Root Watershed. Vegetation data from satellite imagery and professional knowledge of the landscape were used to identify these areas, which are depicted across all ownerships to more accurately describe the current situation. Treatments would only occur on BLM administered lands or in cooperation with other landowners. Forest health concerns include occurrence or high susceptibility for insect/disease outbreak, increased fuel loading, and departure from the historic range of variability (species composition, structure, etc.).

The National Fire Plan, Healthy Forests Initiative, and Healthy Forests Restoration Act emphasize reducing hazardous fuel accumulations and restoring the health and natural processes within forests and rangelands. In addition, these authorities provide direction to land management agencies to reduce the immediate hazards to communities in the wildland-urban interface (WUI). Management should also prioritize the protection of areas that enhance, restore, or maintain plant communities that are critical for endangered, threatened, or sensitive plant and animal species. As a result, the use of prescribed fire and/or mechanical treatments, or other

means of treating hazardous fuels, to promote healthy forest conditions will be incorporated into land use planning (Map 6; South Tobacco Roots Conifer Encroachment).

Issues

1. The physical characteristics of many sites, combined with the lack of natural disturbances, have allowed conifers to encroach into grass, riparian, and aspen communities.

2. Hazardous fuels are increasing in and around the rapidly developing wildland-urban interface.

3. Plant species age class, diversity, and distribution that are not within their historical range of variability for the forest and shrub communities.

4. Weed infestations and the effects of fires on the spread of noxious weeds.

Recommendations

1. Analyze the use of prescribed fire, mechanical treatments, timber sales or other means to mitigate threats to private property in and around the wildland-urban interface, conifer encroachment into sagebrush sites and/or riparian areas, reduce intra-stand competition due to overstocking and address other site specific concerns.

2. Consider developing and implementing a Fire Use Plan for the Ruby Mountain Wilderness Study Area (approximately 1200 acres are in the STR watershed).

3. Focus treatments within areas that are in Condition Class 2 and 3 and in areas historically dominated by Douglas-fir savannah, aspen, and where it occurred, whitebark pine.

4. For prescribed burning, require appropriate rest from livestock grazing. Require rest from livestock grazing in proposed treatment areas one year prior to treatment and a minimum of two growing seasons following the treatment. Coordinate implementation and grazing schedule with lessees.

5. Minimize the effects of smoke from prescribed burning on air quality. Meet the Montana air quality standards by burning when atmospheric conditions allow for good dispersion and transportation of smoke caused from prescribed burning.

Interdisciplinary Team Composition

Core IDT members:

David Early, IDT lead, Rangeland Management Specialist
Kipper Blotkamp, Fuels Specialist
James Roscoe, Wildlife Biologist
Paul Hutchinson, Fisheries Biologist
Steve Armiger, Hydrologist/Riparian Coordinator
Pat Fosse, Assistant Field Manager for Renewable Resources
Joe Casey, Forester

Support IDT members:

Laurie Blinn, GIS Specialist
Mark Sant, Archeologist
Michael Mooney, Weeds Specialist
Brian Hockett, Rangeland Management Specialist TES-plants
Aly Piwowar, Forester
Susan James, Outdoor Recreation Planner/Ennis
Kelly Bockting, Wildlife Biologist
Bob Gunderson, Geologist/Mining
Rick Waldrup, Outdoor Recreation Planner/Wilderness Specialist
Jeff Daugherty, Real Estate Specialist

Other support personnel:

Katie Benzel, Wildlife Biologist Technician
Eric Broeder, Range Technician
Matt Stoltenberg, Range Technician
Grace Desmarais, Wildlife Biologist Technician
Tanya Thrift, Range Technician
Kate Givens, Administrative Assistant
Ellen Daugherty, Administrative Assistant

Other agency staff consulted or involved in specific assessments:
Dick Oswald, Fisheries Biologist, Montana Department of Fish, Wildlife and Parks
Gary Berger, Soils Scientist, USDA, NRCS

REFERENCES - LITERATURE REVIEWED and/or CITED DURING THE PREPARATION OF THIS DOCUMENT

Bitterroot Restoration 2004. BLM Riparian and Wetland Databases. http://www.bitterrootrestoration.com/Lasso/default.html

Connelly, J. W; H.W. Browers and R.J. Gates. 1988 Seasonal movements of sage grouse in southeastern Idaho. Journal of Wildlife Management 52:116-122.

Connelly, J.W; W.A. Wakkinen, A.D. Apa, and K.P. Reese 1991. Sage grouse use of nests sites in southeast Idaho. Journal of Wildlife Management 55:521-524.

Cooper, S.V., Jean, C. and B. L. Heidel. 1999. Plant Associations and Related Botanical Inventory of the Beaverhead Mountains Section, Montana. Unpublished report to the Bureau of Land Management. Montana Natural Heritage Program, Helena, MT.

Cooper, S.V., P. Lesica, R.L. DeVelice and Timothy McGarvey. 1995. Classification of southwestern Montana plant communities with emphasis on those of Dillon Resource area, Bureau of Land Management. Montana Natural Heritage Program, Helena, MT.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S.Fish and Wildlife Service, Washington, D.C. FWS/OBS – 7/31. 103 pp.

Crowley, C.M. and J.W. Connelly, 1996. Sage grouse populations and habitat trends in southeastern Idaho and southwestern Montana. ID Dept. of Fish and Game. Pocatello, ID. 203 pp.

DeVelice, R.L. 1992. Classification of the plant communities of Beaverhead, Silver Bow, and Madison counties, Montana. Volume I (text). Montana Natural Heritage Program, Helena, MT.

Frisina, M.R. and J.J. McCarthy. 2001. Montana Sagebrush Bibliography. Montana Fish, Wildlife & Parks.

Hansen, P.L., S. Chadde and R. Pfister. 1988. Riparian Dominance Types of Montana. Misc. Pub. No. 49. Montana Forest and Conservation Experiment Station, University of Montana, Missoula, MT.

Hann, W.J., Bunnell, D.L. 2001. Fire and land management planning and implementation across multiple scales. Int. J. Wildland Fire. 10:389-403.

Hardy, C.C., Schmidt, K.M., Menakis, J.M., Samson, N.R. 2001. Spatial data for national fire planning and fuel management. International Journal of Wildland Fire. 10:353-372.

Lacey, John and J. E. Tayor. 2003. Montana Guide to Range Site, Condition and Initial Stocking Rates. Montana State University Extension Service.

Lacey J.R. and W.P. Volk. 1988. Forage Use—A Tool for Planning Range Management. Montana State University Extension Service. Bozeman, MT.

Laverty, L., Williams, J. 2000. Protecting people and sustaining resources in fire-adapted ecosystems. A cohesive strategy. Washington Office, Forest Service, US Department of Agriculture.

Lesica, P. 1998. Conservation status of Carex parryana ssp. idadoa in Montana. Unpublished report to Bureau of Land Management. Montana Natural Heritage Program, Helena. 32 pp. plus appendices.

Lesica, P. 2003. Conserving Globally Rare Plants on Lands Administered by the Dillon Office of the Bureau of Land Management. Report to the USDI Bureau of Land Management, Dillon Office. Montana Natural Heritage Program, Helena, MT.

Lesica, P. and J. Vanderhorst. 1995. Sensitive plant survey of the Sage Creek area, Beaverhead County, Montana. Unpublished report to the Bureau of Land Management. Montana Natural Heritage Program. 36 pp. plus appendices.

Leopold, L.B., D. L. Rosgen, H. L. Silvey, W.W. Emmett A Guide to Field Identification of Bankfull Stage in the Western United States. USDA Forest Service Rocky Mountain Forest and Range Experiment Station Stream Systems Technology Center, Fort Collins, CO. Video 31 minutes.

Leopold, L.B. (1994): "A View of the River". Harvard University Press, Cambridge, Mass. 298 pp.

Leopold, L.B., M. G. Wolman & J.P. Miller (1964, 1992): Fluvial Processes in Geomorphology. Dover Publications, New York

Marshall, K. Anna. 1995. Cercocarpus ledifolius. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2005, December 13].

McIntyre, J. D. and B. E. Rieman. 1995. Westslope cutthroat trout. Pages 1-15 in M. K. Young, Technical Editor. Conservation Assessment for Inland Cutthroat Trout. USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado

McWilliams, Jack. 2002. Centrocercus spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2004, Dec. 22].

MDEQ 2006. Air Resources Management Bureau
http://www.deq.mt.gov/pcd/arm/index.asp

MDEQ 2005-2006. Air Quality Major Open Burning Permit #SM0009. Bureau of Land Management Montana/Dakotas.
http://www.deq.mt.gov/AirQuality/ARM_Permits/06-BLM_09.pdf

MDEQ 2006. Montana Department of Environmental Quality. 2006 Integrated 305b/303d Water Quality Report for Montana
http://www.deq.mt.gov/CWAIC/wq_reps.aspx?yr=2006qryId=5360

MDEQ 2006. Montana Department of Environmental quality. Ruby River Watershed Water Quality Restoration Plan and Total Maximum Daily Loads
http://www.deq.state.mt.us/wqinfo/TMDL/Ruby/PRRubyCover.pdf

Montana Fish Wildlife Parks, 2002. Management Plan and Conservation Strategies for Sage Grouse in Montana; Helena, MT. 96 pp.

Montana Fish Wildlife & Parks. Undated. Sagebrush Bulletin. An online publication.
http://fwp.state.mt.us/insidefwp/fwplibrary/sagebrushbulletin.asp

Montana Idaho State Airshed Group
http://www.smokemu.org/

Montana Natural Heritage Program. 2002. "Montana Bird Distribution." [Online].
http://nhp.nris.state.mt.us/mbd/ (2004, Dec. 22)

Montana Natural Heritage Program. 2006. "Rare Plant Field Guide." [Online].
http://mtnhp.org/plants/guidebook.asp

Montana Partners in Flight. 2000. Montana Bird Conservation Plan, Version 1.0. American Bird Conservancy, MT Fish Wildlife Parks, Kallispell, MT. 288 pp.

NRCS National Water and Climate Center 2004. Beaverhead County – Average Annual Precipitation (1961 – 1990).
http://nris.state.mt.us/gis/gisdatalib/downloads/precip_Beaverhead.pdf

Oswald, Richard A. 2003. Inventory and Survey of Selected Stream Fisheries of the Red Rock, Ruby, and Beaverhead River Drainages of Southwest Montana; 2000-2002. Montana Department of Fish, Wildlife and Parks.

Roscoe 2002. J.W. Sage grouse movements in Southwestern Montana. Intermountain J. Science. 8(2):94-104

Rosgen D. and L. Silvey. 1998. Field Guide for Stream Classification. Wildland Hydrology. Second edition ISBN 0-9653289-1-0.

Rosgen, D.L, (1994) A Classification of Natural Rivers. Catena, Vol. 22 pp. 169-199. Elsevier Science, B.V. Amsterdam.

Rosgen, D.L (1996) Applied River Morphology. Wildland Hydrology, Pagosa Springs CO 352 pp

Schmidt, K.M., Menakis, J.P., Hardy, C.C., Hann, W.J., Bunnell, D.L. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. General Technical Report, RMRS-GTR-87, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

Shepard, B., B. Sanborn, L. Ulmer and D. Lee 1997. Status and Risk of Extinction for Westslope Cutthroat Trout in the Upper Missouri River Basin, Montana. North American Journal of Fisheries Management 17:1158-1172, 1997.

Shepard, B.B., B.E. May and W. Urie. 2003. Status of Westslope Cutthroat Trout (Oncorhynchus clarki lewisi) in the United States: 2002. Montana Fish, Wildlife and Parks for the Westslope Cutthroat Trout Interagency Conservation Team, Helena, Montana

Smoliak, S., R.L. Ditterline, J.D. Scheetz, L.K. Holzworth, J.R. Sims, L.E. Wiesner, D.E. Baldridge, and G.L. Tibke Undated. Montana Interagency Plant Materials Handbook – an online publication http://animalrangeextension.montana.edu/Articles/Forage/Species/Grasses/

Tesky, Julie L. 1993. Cygnus buccinator. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2004, Dec. 22].

Tiner, R.W., J.R. Fieldguide to Nontidal Wetland Identification. Maryland Department of Natural Resources, Annapolis, MD and U.S. Fish and Wildlife Service, Newton Corner, MA. Cooperative Publication. 238 pp.

U.S. Army Corps of Engineers. 1987. Wetland Delineation Manual. Final Report. Wetlands Research Program Technical Report Y-87-1.

USDA Forest Service/Bureau of Land Management. 2002. Land Use Strategy for Implementing the 1999 Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout in Montana. Addendum I, Version 4.7 (revised 7/3/02).

USDA, NRCS. 2001. The PLANTS Database, Version 3.1 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

USDA SCS Montana 1983. Guide for determining range condition and initial stocking rates for the foothills and mountains 15"-19" P.Z., east of the continental divide.

USDA SCS Montana 1985. Guide for determining range condition and initial stocking rates for the foothills and mountains 10"-14" P.Z., east of the continental divide.

USDA, SCS, Soil Survey of Madison County Area, Montana. 1989.

United States Department of the Interior, Bureau of Land Management, Dillon Field Office. 2006. Dillon Field Office Riparian Database.

United States Department of the Interior, Bureau of Land Management, 1989. Inventory and Monitoring of Riparian Areas -TR 1737-3.

United States Department of the Interior, Bureau of Land Management, 2001. A Guide to Managing, Restoring, and Conserving Springs in the Western United States-TR 1737-17.

United States Department of the Interior, Bureau of Land Management, 1989. BLM Manual Handbooks H-1741-1 (Fencing).

United States Department of the Interior, Bureau of Land Management, 1997. Grazing Management for Riparian Wetland Areas - TR 1737-14.

United States Department of the Interior, Bureau of Land Management, 2000. Interpreting Indicators of Rangeland Health – Version 3 - TR 1734-6.

United States Department of the Interior, Bureau of Land Management, 1993, Revised 1995. Process for Assessing Proper Functioning Condition - TR 1737-9.

United States Department of the Interior, Bureau of Land Management, 1998. A User Guide to Assessing Proper Functioning Condition and Supporting Science for Lotic Areas - TR 1737-15.

United States Department of the Interior, Bureau of Land Management, 1999. A User Guide to Assessing Proper Functioning Condition and Supporting Science for Lentic Areas - TR 1737-16.

United States Department of the Interior, Bureau of Land Management, 2003. Riparian Wetland Soils - TR 1737-19.

United States Department of the Interior, Bureau of Land Management, 1991. Riparian Wetland Initiative for the 1990's.

United States Department of Interior Bureau of Land Management. 1954. Land Planning and Classification report of the Public Domain Lands in the Upper Missouri River Basin.

United States Department of Interior Bureau of Land Management. 1994. Rangeland Reform '94 Draft Environmental Impact Statement.

United States Department of Interior Bureau of Land Management Montana State Office. 1997. Environmental Impact Statement Record of Decision for Standards for Rangeland Health and Guidelines for Livestock Grazing Management in Montana, North Dakota and South Dakota

United States Department of Interior Bureau of Land Management. 2001. H-4180-1 – Rangeland Health Standards.

United States Department of the Interior, Bureau of Land Management, Dillon Field Office. 1980. Mountain Foothills Grazing Management Program Draft Environmental Impact Statement.

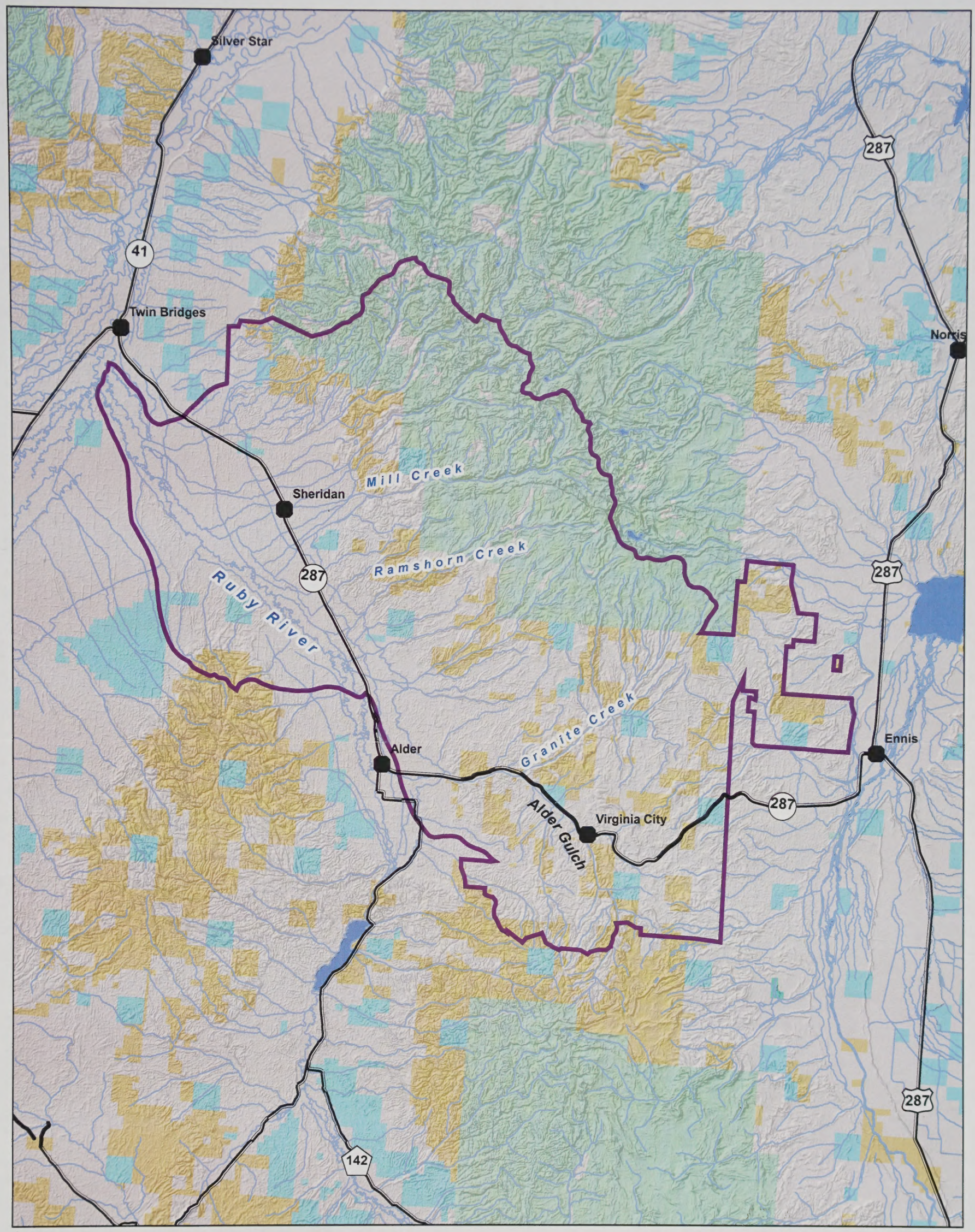
United States Department of Interior Bureau of Land Management, Dillon Field Office. 2004. Draft Dillon Resource Management Plan and Environmental Impact Statement, Volumes I & II.

United States Environmental Protection Agency, 1998. Interim Air Quality Policy on Wildland and Prescribed Fires.
http://www.epa.gov/ttncaaa1/t1/memoranda/firefnl.pdf

United States Fish and Wildlife Service. 1997 A System for Mapping Riparian Areas in the Western United States, Lakewood, CO.
http://www.fws.gov/nwi/Pubs_Reports/Riparian/riparian.pdf

Wambolt, C L. and M. R. Frisina. 2002. Montana Sagebrush Guide. Montana Department of Fish, Wildlife and Parks. Helena, MT.

Map 1 - South Tobacco Root Watershed Assessment Area

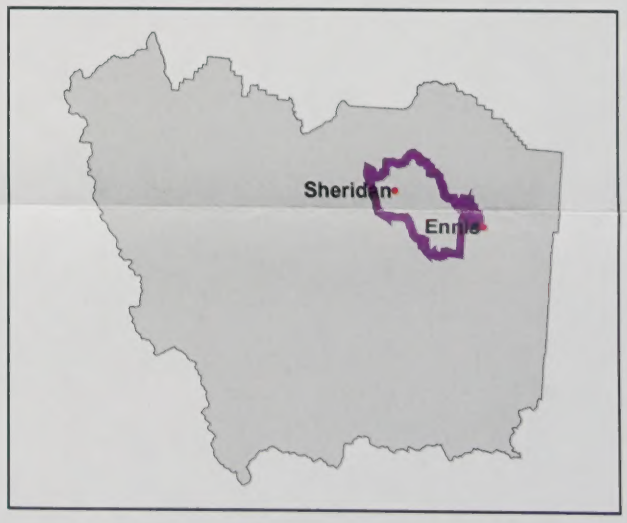


- Main Roads
- Streams
- Bureau of Land Management
- Bureau of Reclamation
- Fish and Wildlife Service - FWS
- Forest Service
- State of Montana
- National Park Service
- Other Federal
- Private
- Lakes
- South Tobacco Root Assessment Area Boundary
- Towns/Cities

0 1 2 4 6 8 Miles

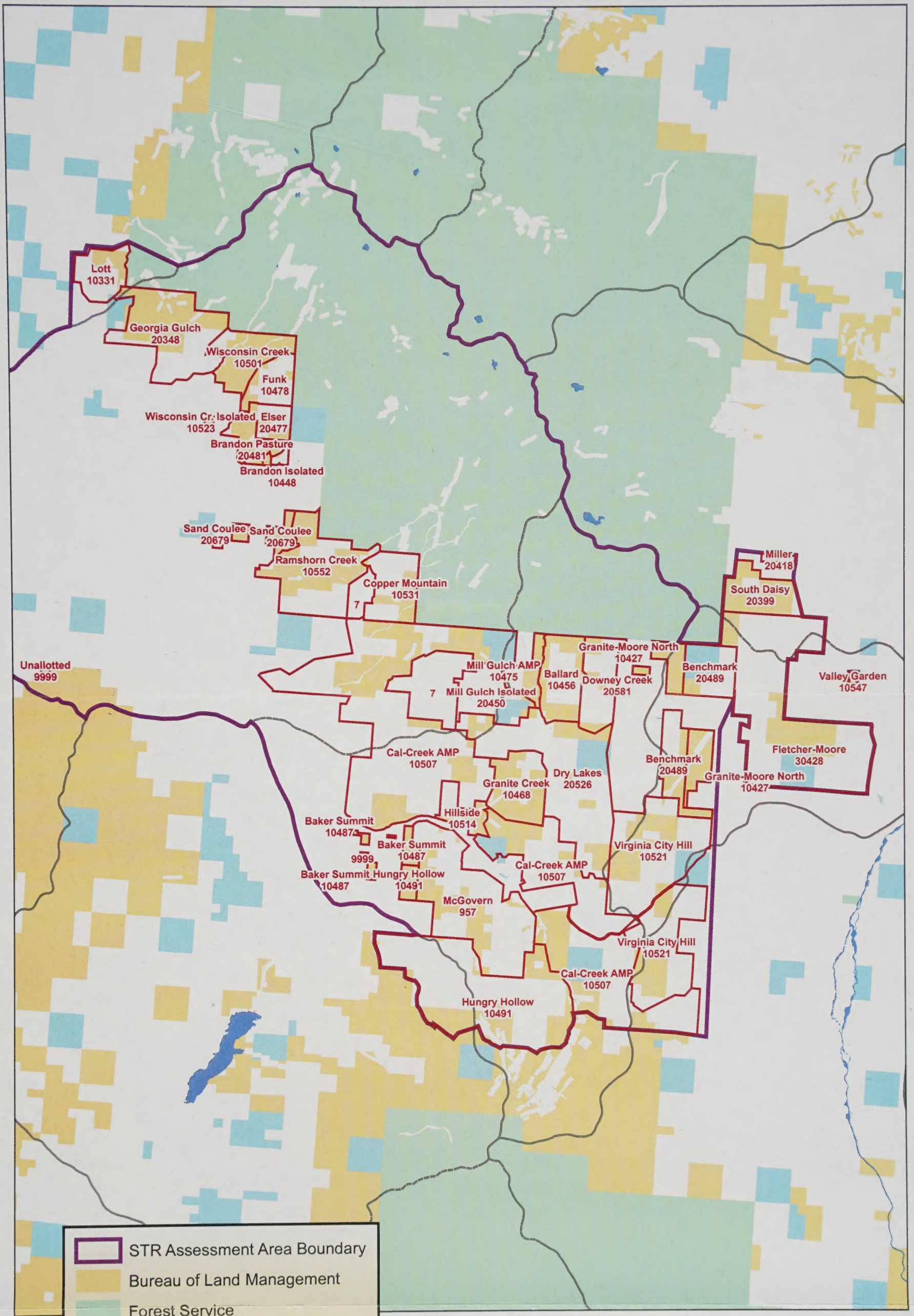
N

Vicinity Map of Sage Creek Watershed Area

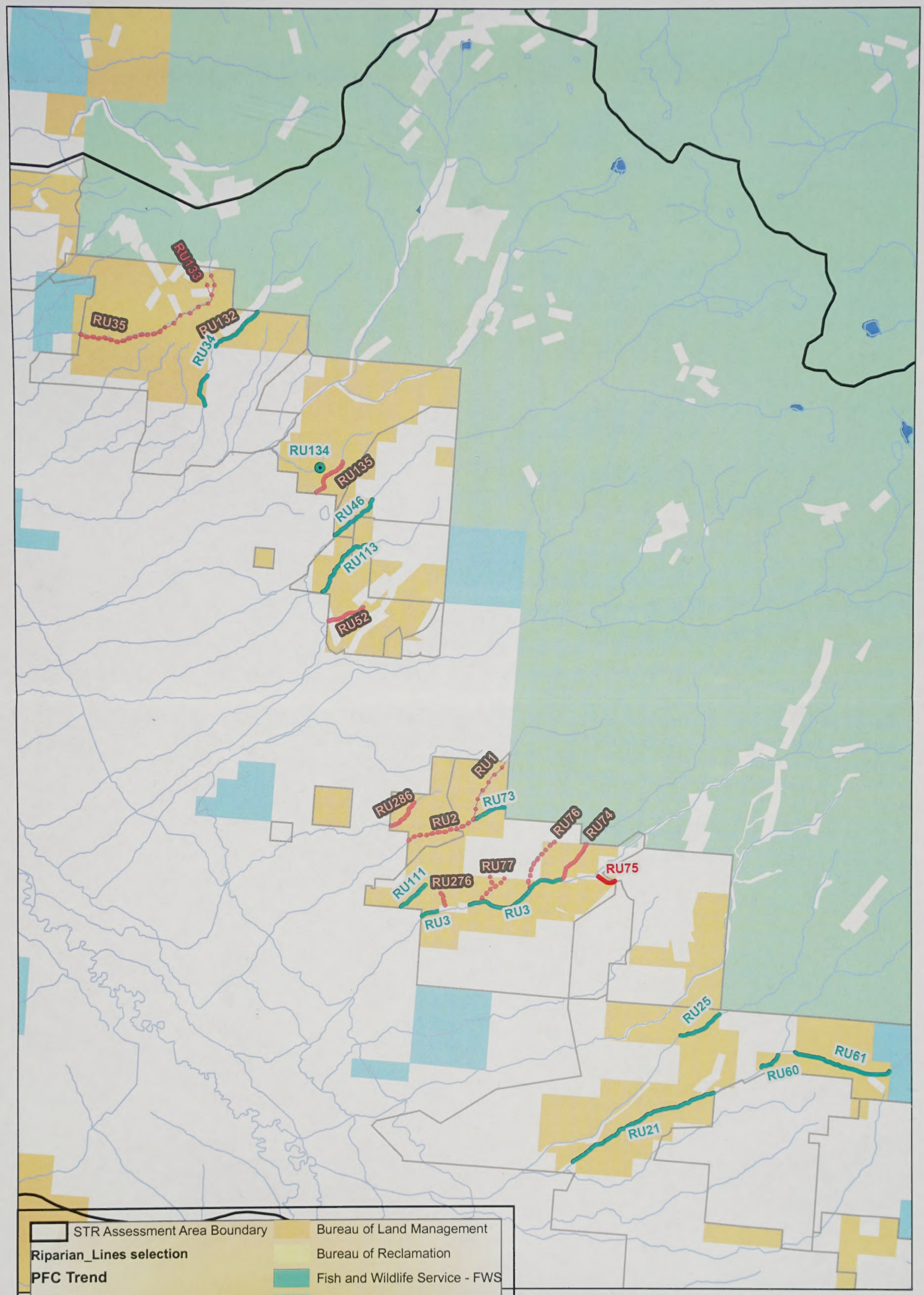


Map 1 - South Tobacco Root Watershed Area

Map 2 - South Tobacco Root Grazing Allotments

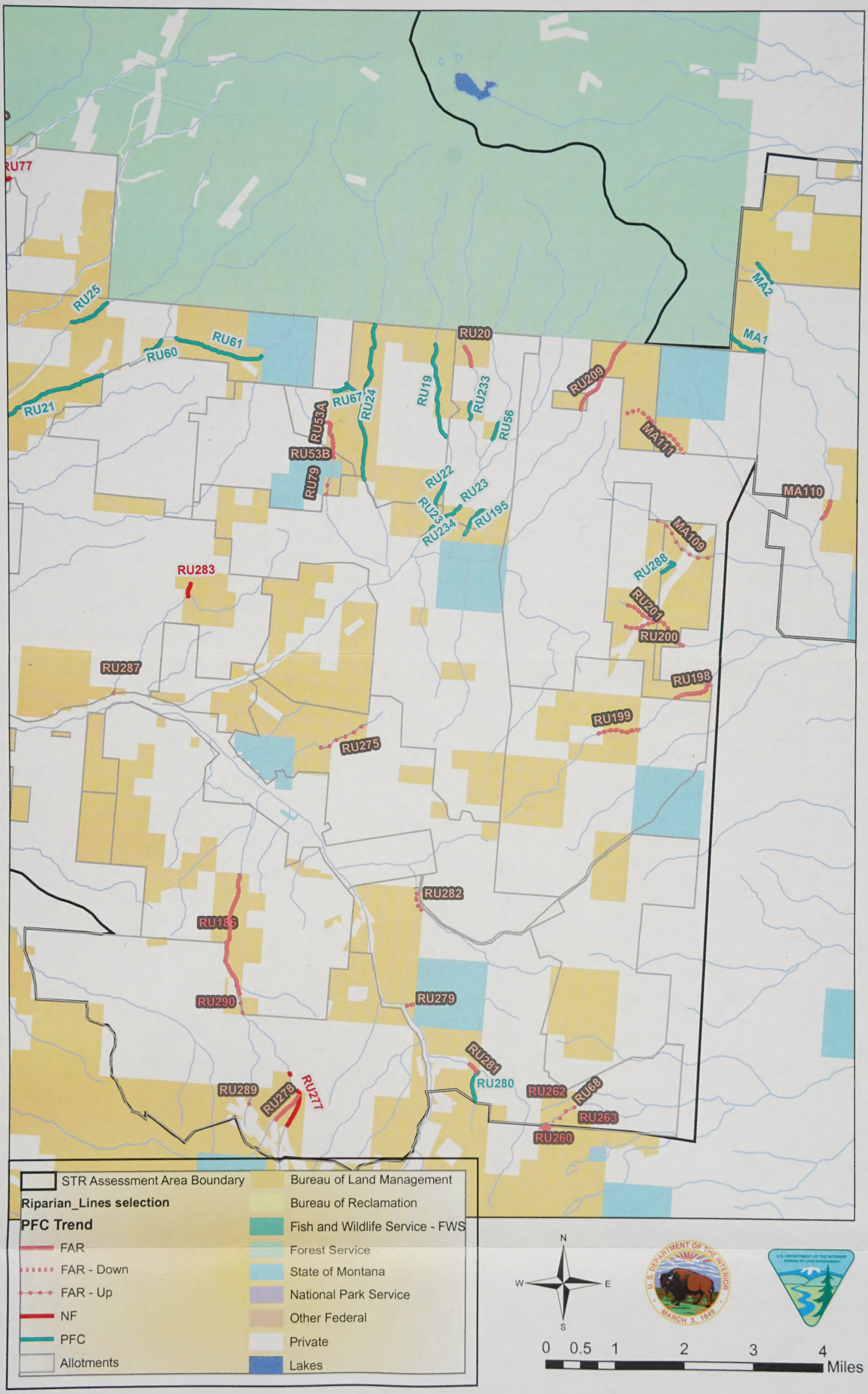


Map 3 - South Tobacco Root Riparian/Wetlands (North Half)

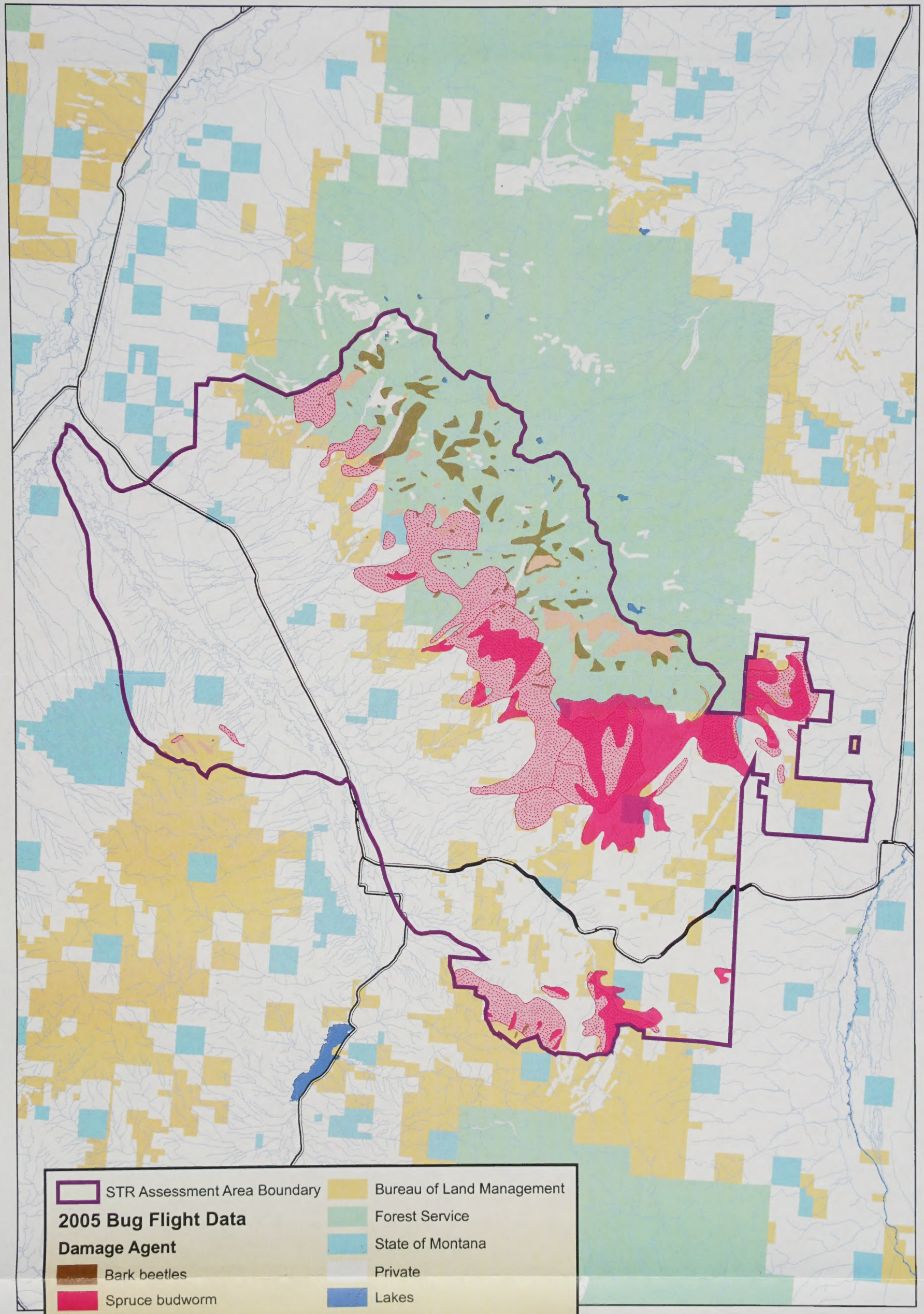


Map 3 - South Tobosco Rod Bidgeland/Wetlands (North Half)

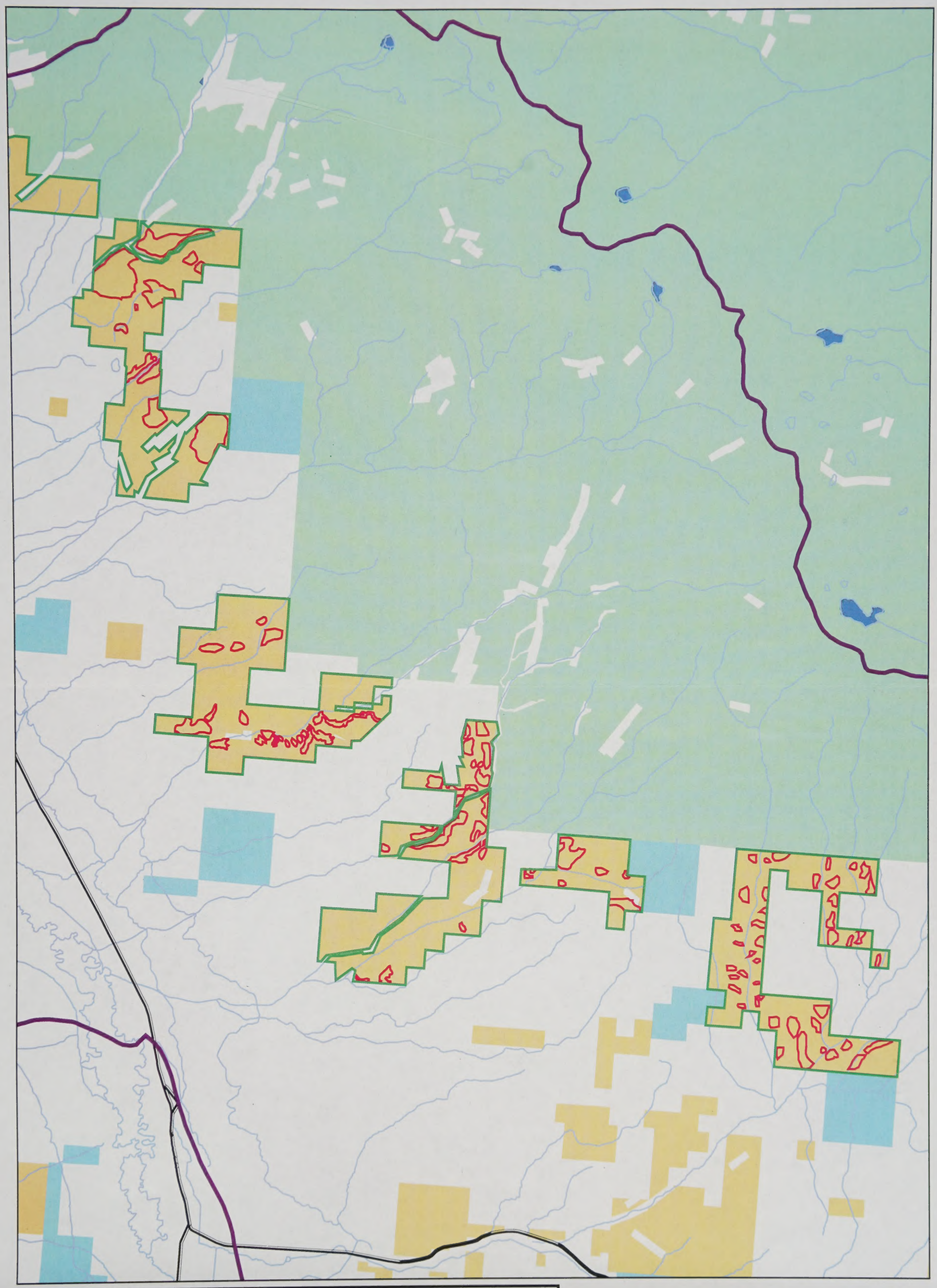
Map 4 - South Tobacco Root Riparian/Wetlands (South Half)



Map 5 - South Tobacco Root Forest Insesct & Disease



Map 6 - South Tobacco Root Conifer Encroachment



Map 2 - County Topsoil Erosion